

NATURE MAGAZINE

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Birds of Western North America

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Nature in Print

By HOWARD ZAHNISER

AMONG the laws of Nature that are designated by the names of the men who first discerned them with exactness there is one to the effect that the pressure of a gas is directly proportional to its density. Every graduate of a high school science course knows that this is Boyle's Law, yet asking what Boyle's first name was might well be a question worth trying out on Information Please, and finding someone with any considerable knowledge about this great scientist is not likely to be a common occurrence. Nevertheless there are probably more people today who would profit more from a knowledge of Boyle's life than from the remembrance of the law that carries his name, and if this is true it is indeed fortunate that a thorough yet eminently readable biography is now available. It is *The Life and Works of The Honourable Robert Boyle*, by Louis Trenchard More.

This is a book that not only explores in the realm of man's thinking those borderlands between medieval dependence on the authority of tradition and what we choose to call the modern reliance on experimental demonstration. It is a book that also explores the excitements of a period of history that, although three hundred years removed from our own, seems now more stirring than quaint. There is in it not only the record of the triumphs of a man of contemplation and investigation, but also the success story, with vicissitudes, of another who came to Dublin with 27 pounds 3 shillings, "two pieces of jewellery, and a fair stock of clothes," and became the most influential man in Ireland, the richest man in Great Britain, the greatest landowner, and the wealthiest man of his day. This latter was Richard Boyle, the great Earl of Cork, the father of Robert Boyle and something of a rival for the interest of the readers of his son's biography. Nor does this seem entirely inappropriate, for if Robert Boyle may be aptly called the father of modern chemistry, the great Earl of Cork was indeed an indulgent grandfather. "With great expressions of gratitude," Robert Boyle wrote of his parentage—thankful both that he was a son and yet not the oldest son, born thus "in a condition that neither was high enough to prove a temptation to laziness, nor low enough to discourage him from aspiring." Certainly regarding the interest in the narrative part of Professor More's biography of Robert Boyle it can be said that it is most tense and spiced with variety when it is related to the large family of the great Earl of Cork and to the world in which they lived. The volume at the outset tells a story of another time as effectively as in its later pages it discusses the works, the philosophy and theology, and the science, of the individual Robert Boyle.

The life of Robert Boyle is interesting, to be sure—his school days, his life at Oxford, his travels, his struggles with poor eyesight, his fear of physicians, his associations with other great scientists, his religious experiences. Yet it is for the authoritative discussion of Boyle's thoughts and works that a reader of this book can be most thankful. These discussions are analytical and topical, written with clarity and with regard to the significance of Boyle's work in the changes and developments in thought and science.

And the character of Robert Boyle is portrayed with a sure skill, so clearly and understandingly that it can be said with all the truth of a figurative expression that the man lives in

the book. It is a skill not only in the use of incidents but in the precision of appraisals. "Born to wealth and high social rank," Boyle, writes Professor More, "sought no further advance in either, and used them to aid his scientific aims. Friendly and modest, he made a host of friends, eagerly learned from them, invited criticism, and gathered data and ideas from all the world. In return he excited wonder and admiration because he, a gentleman, engaged in scientific work; his companionship was sought and his accomplishments were exaggerated because he could foster scientific undertakings and dignify their importance."

"Boyle's reputation," Professor More explains, "does not rest on great inventions, such as Newton's does, but on his ability to popularize empiric science and to supersede the scholastic and medieval philosophy by the Baconian and corpuscular philosophy. His influence on thought was profound, but although he was the founder of modern chemistry, he made no epoch-making discoveries. He himself was the first to acknowledge this. He says repeatedly that he was the historian of science, accumulating a mass of experimental data of all sorts in order that others might later build on it a sound knowledge and philosophy."

It is a fact that others have so built. Boyle and his contemporaries founded the Royal Society, and in only a slightly less accurate sense they established what we call science. Yet Boyle was likewise a theologian, not a clergyman but a lay theologian, and his biographer confesses a difficulty in discriminating between the theologian and the scientist. So also was Boyle an alchemist, and one who worked on the multiplying of gold

"with ever increasing hope of success." Between the scientist and the theologian there was no exclusive division in Boyle's time, nor was there yet one clearly discerned between the alchemist and the chemist. It was still a time for "men of parts," and the one man might be all three, and as it so happened in the case of Robert Boyle he might likewise be a popular writer of essays and the author of a romance that the great Johnson called the first attempt "to employ the ornaments of romance in the decoration of religion."

When he was thirteen years old, Robert Boyle experienced a religious conversion, vowing during his fears in a great thunder storm and tempest that if he survived that danger "all his future additions to his life should be more religiously and watchfully employed." And in later years

he rejoiced, as Professor More says, "that the vows he had made under the influence of terror were renewed and persisted in as a result of his calmer judgment." It was his aim in science to prove the works of God, in living to be a Christian, in the church to work for unity, and in all ways possible to spread the Gospel. Professor More's volume will thus be of value to those interested in theology and religion, as well as to those with a particular concern with science, and the book includes as an appendix an essay by his brother, Paul Elmer More, on "The Spirit of Anglicanism."

Other readers will value this work for its chapter on "Alchemy and Medieval Science" and the discussion that follows of "Boyle as Alchemist." Still others will consider most important the final two chapters on "Boyle as the Sceptical Scientist" and "Boyle as Creative Natural Philosopher." All who read it will value it as a biography and as an aid to the better understanding of our own comprehension of Nature.

The Life and Works of The Honourable Robert Boyle. By Louis Trenchard More. London, New York, and Toronto: Oxford University Press. 1944. 313 pp., with portrait frontispiece, notes, and index. \$4.50.

Life and Letters

By ARCHIBALD HOWARD

All day long
The cardinal's song
Has whistled in my ear!
"Watch here!
"What cheer, cheer, cheer!"
While the nightingale of Keats
In silence repeats
A music no listeners hear.

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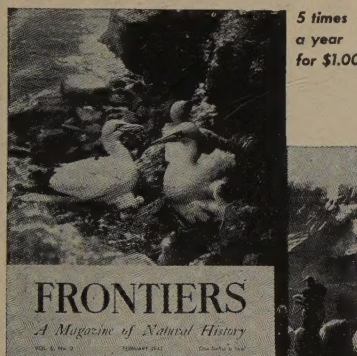
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For the Youngsters

Weejack and His Neighbors. By Carroll Lane Fenton. New York. 1944. The John Day Company. 128 pages. Illustrated by the Author. \$1.75.

Carroll Lane Fenton is a geologist and one of the outstanding writers in this field. He is the author of several books for a variety of audiences, but in this latest little book he writes for a very young audience. He has chosen "Weejack," the woodchuck, as his central character, but introduces his neighbors, including Jet, the field cricket; Mother Garter Snake; Queen Monarch and her babies; Fluff and Brownie, the cottontails; Silver, the gray squirrel; Spot, the skunk; Dorsa, the painted turtle; Wah-chusk, the muskrat; Skimmer and Ripa, the bank swallows, and Terra, the box turtle. Knowing the author, we suspect that he thoroughly enjoyed writing this little book, and we know that many youngsters will enjoy reading it. The author's illustrations are excellent.

Forester's Language

Forest Terminology. Washington, D. C. 1944. The Society of American Foresters. \$2.00.

Compiled by a committee of specialists under the chairmanship of Ralph C. Hawley of the Yale School of Forestry, this is a glossary of some 4500 words and terms used in forestry and allied fields. The book covers the terms used in forest management and economics, silviculture, forest mensuration, wood technology, lumbering and wood-using industries, wildlife and recreation, range management, forest fire control, forest entomology and forest pathology. The words and terms are defined, listed and cross-referenced.

Home Horticulture

Plants and Flowers in the Home. By Kenneth Post. New York. 1944. Orange Judd Publishing Company. 198 pages. Illustrated. \$2.00.

This is a guide to gardening indoors. The early chapters deal with the types of plants for home horticulture, the care of the plants and other general details. Sections are then devoted to specific flowering and foliage plants, to dish gardens, water gardens, soilless gardens, diseases of the plants and cut flowers. The author, who is associate professor of floriculture at Cornell University, has produced a handy and practical text in a specialized field of gardening.

Chemistry of Synthetics

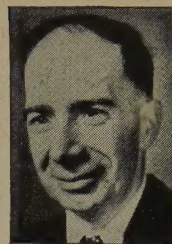
The Chemistry of Synthetic Substance. By Emil Dreher. New York. 1944. The Philosophical Library. 103 pages. \$3.00.

This is a little book for the chemist summarizing the latest research in the field of chemistry as applied to the production of synthetic substances. The discussion is highly technical.

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Devoted to the Practical Conservation of the Great National Resources of America

IN THIS ISSUE

May, 1944

Vol. 37, No. 5

Cover Design—Dall's Sheep.....	Hexom
Nature in Print.....	Howard Zahniser 226
Life and Letters (Poem).....	Archibald Howard 226
Contents Noted.....	R. W. W. 231
The Groves Go to War.....	Edna H. Evans 233
Imogene Anopheles.....	Garnet W. Jex 237
Sea Lion Prima Donnas.....	Clarissa Lorenz 240
Dandelions (Poem).....	Donald Milton Hein 243
Desert Cinder Cones.....	John Lindsey Blackford 244
The Wood Thrush Arrives.....	Julian Burroughs 245
Yours for the Listening.....	J. Charles Tracy 247
Prairie Chicken Panorama	
Charles and Elizabeth Schwartz	249
A Good Tern.....	Margaret L. Perry 253
Visit to Slabsides.....	Edwin Way Teale 254
Grasshopper Sparrow.....	George A. Smith 256
As We See It (Editorial).....	257
Wild Flowers in the Dolomites	
Edith A. Piotrowski	258
Nesting Novelties.....	Paul H. Oehser 261
You See What You See	
Willard Hallam Bonner	263
Cinderella Lily Now A Princess.....	Carroll Abbott 264
Fly High (Poem).....	Morris Silverman 266
Preserving Baneberries.....	Edwin F. Steffek 266
One of Them Is Green.....	Louisa R. Gleason 267
The Stars as Suns.....	Isabel M. Lewis 268
The Loftiest Leaper.....	Edith M. Laing 270
Maxim (Poem).....	Paul Churcher 270
The School Page.....	E. Laurence Palmer 272
Under the Microscope.....	Julian D. Corrington 278

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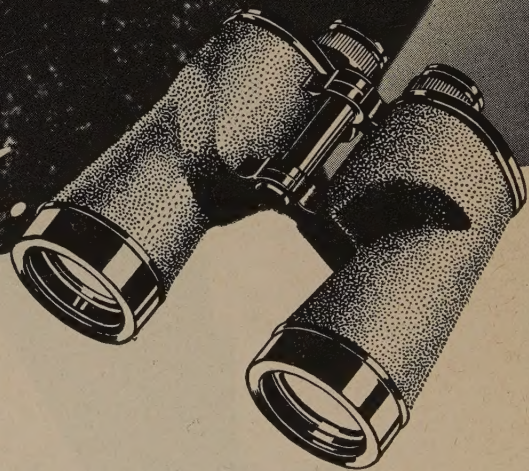
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Contents Noted

When we get to be dictator—which seems highly unlikely, although we can still dream—we will, beside enforcing the objectives of the National Association for the Prohibition of Putting Parsley on Plates and the tenets of the International Society to Require Typed or Printed Versions of Personal Signatures on Letters, set up a letter-writing concentration camp for the so-called gentler sex. To it we will consign females who persist in failing to indicate whether they are Miss or Mrs. There will be a camp coeducational annex for those afflicted by parents with bisexual names like Vivian and Marion, and with family names promoted to given-name rank but still equally indeterminate. Each internee will be required to write his or her name, with the proper prefix, five thousand times a day in soft sand upon which will be blowing a gale born of the propellers of a Flying Fortress.



We have, from time to time, toyed with the idea of using Nature jokes in this magazine, but have discarded the idea since most of those manufactured by the jokesmiths seem to us forced and un-natural. A reader, Mrs. Hale of Huntington, West Virginia, suggests that there might be a corner for humorous or pertinent Nature observations by youngsters. As examples she cites two authored by her daughter, Nell Rose, at the imaginative age of four. Mother had remarked that she was always getting penguin and pelican mixed, whereat Nell Rose said, "Oh, that's easy. A pelican is a bird and a penguin is in a clock." Later, on smelling a painted daisy, she observed, "It doesn't smell sweet; the bees haven't put honey in it yet." Which recalls a remark by our own hopeful at about the same age. We were driving home toward a gorgeous sunset that painted the clouds. Out of the silence she said, "It looks like the angels took off their wings and laid them on the sky." Should we pursue this idea further?

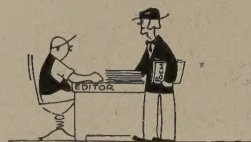


Beekeepers are public benefactors who have not been fully appreciated by an otherwise preoccupied public, according to C. L. Farrar of the U. S. Bureau of Entomology and Plant Quarantine. Their charges

help pollinate seed fields and orchards, performing a vital service far greater in value than the honey from the hives. Dr. Farrar also holds out comfort to prospective beekeepers by assuring them that only the first few stings are hard to take. If they will take these in good grace they will gradually build up an immunity to swellings so that the stings will be less troublesome than a mosquito bite. You also have to like bees and know what you are about properly to manage the hive. We are afraid we will never be a public benefactor through bees because we still find it impossible to sit statue-like and let a bee buzz around our neck looking for a soft spot to sit down on and push.



This editorial podium provides us with a vantage point from which to broadcast occasional reflections that come to mind as we perform our daily stint. This time it is poems and poets. For a long time we used no Nature poems. Then, a few years ago, readers responded to an editorial questionnaire by overwhelmingly endorsing the use of "a limited amount of original Nature poetry." So we embarked on this policy. We are able to use perhaps forty poems a year. Yet a good Monday morning's mail will bring as many as fifty poems to our desk. The week's grist is about a hundred; the year's a good three thousand. We have been amazed at the general excellence of the poems submitted, the great number of poets, and, if *our* mail is any criterion, how loaded with disappointment a poet's life must be. Hundreds must hate us heartily, and we are sorry, because we like their poems and wish we could afford the space—not to mention the modest checks—to use them all. Right now we have a stock of poems in hand and in type that will care for all possible needs for the balance of this year and into 1945.



"Only two pressmen today. . . . Two more compositors drafted. . . . Four mailing girls have gone to work for the Government"—These and other mournful reports come from our printer as he struggles to get NATURE MAGAZINE off the press and into the mails. So, we hope our readers will understand when the magazine comes late. He and we are doing the best we can. And if there happen to be physical defects in your copy, these also are due to problems of production. Write us a postal card and we will replace the defective magazine. Thank you. R.W.W.



Serving humanity at war on many fronts and in many ways, these golden oranges and their relatives in the Citrus Family have truly "gone to war". Besides the essential vitamins that they supply, research has discovered that the citrus fruits supply by-products vital in both medicine and industry. Nowadays nothing must be wasted thoughtlessly.

*Oranges and grapefruit, lemons and limes,
aid the health of humanity as—*

The Groves Go to War

By EDNA H. EVANS

OUR citrus groves are in the war. In Florida, California, Texas and Arizona endless rows of green-clad trees stand like soldiers, drawn up in battle array and fighting for the health of humanity. When services in this war are listed, a high place on the roll of honor should be reserved for these fighting citrus fruits.

Of course the trees, themselves, are not on the battle lines. Yet, ever since the conflict opened in Europe, they have been producing an endless stream of gold and yellow fruit, much of which has found its way into war areas.

Increasingly, for the past generation, citrus fruits have been prized for their health-giving qualities. And now, more than ever before, the orange, the grapefruit, the lime and the lemon are doing their part to help mankind, in the midst of air raids and bombardments, on battle fields, in hospitals and among civilians of war-stricken areas.

Knowledge of the benefits of citrus fruits is nothing new. The orange is one of the oldest of the cultivated fruits, so old that its origin is not definitely known. It is thought to have originated in China and Chinese scholars were singing its praises a thousand years ago. Limes and lemons are old, too, while the hybrid grapefruit has been known for less than four centuries.

Citrus fruits are especially rich in vitamin C, which is so essential to human health. Scurvy results from the lack of it. Bone and tooth development is impaired and the body becomes increasingly susceptible to infectious diseases when it is absent. Yet, important as it is, it cannot be stored in the body, but must be eaten daily to renew the supply in the human system.

In wartime, vitamin C is especially important. It helps wounds to heal. It gives extra energy to fighting men. It aids the fliers in our fighter planes and bomber fleets to withstand high altitudes, and it helps the crews of our submarines to sustain the pressures of the oceans' depths.

Army medical men have found that soldiers, sailors, airmen and marines need a minimum of 75 milligrams of vitamin C each day. Paratroopers and com-

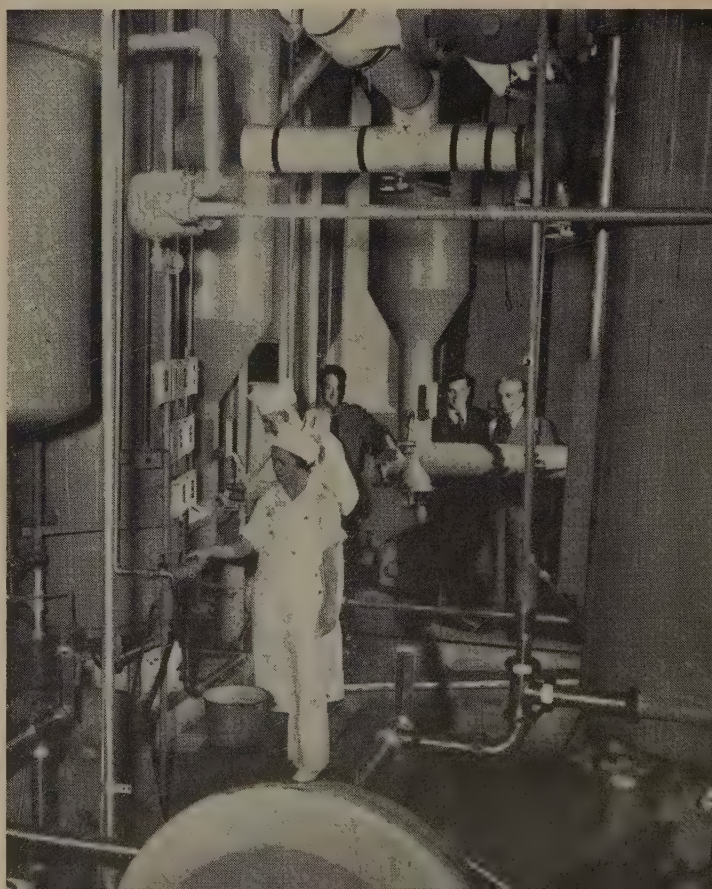
Production of citrus fruit concentrates has been given a tremendous impetus by the war demands. Here white-clad workers supervise the processing of citrus products in the form of less-bulky but vitamin-rich syrups that are used by our fighting men and our allies.

mandos should have an even greater ration of from 105 to 115 milligrams a day.

Citrus fruits, especially tangerines, also supply vitamin A, which promotes growth and improves night vision. The importance of this vitamin was stressed by Air Marshal Sir Harold E. Wittingham, RAF medical director-general, at the annual convention of U. S. military surgeons in November, 1943.

"In Malta," he said, "there was an almost complete lack of fresh fruit, and it was learned that RAF pilots on leave in Cairo regained their night vision in seven to ten days." He said his own study showed that American troops in Tunisia, supplied with citrus fruit juices, had high night vision. Australian troops, with juice diets, also had good night vision. The British fliers at Malta had no fruit juice and poor vision.

Vitamin P, or citrin, is found chiefly in grapefruit and lemon peel. This is a more recently discovered food factor that is concerned with the strength and permeability of the walls of the tiny blood vessels known as capillaries. Citrus fruits also supply such needed minerals as calcium, phosphorus and iron.



Citrus juice is being used in hospitals to promote the healing of wounds and to alleviate the shock of injuries and surgical operations. A British doctor has reported that fifty-seven cases of TNT poisoning were successfully treated with orange juice.

Like all others in the country, the citrus industry has trimmed away nonessentials. This has not been done easily. Growers, packers, and canners have been faced with serious labor shortages. All have had ceiling prices and other regulations to contend with. Yet, in spite of it all, citrus products have continued their steady flow to our armed forces and to our allies in many parts of the world.

Scientific research has discovered many uses for citrus fruits and their by-products. Much of this work, done before the war, has proved to be of immeasurable value since the opening of the conflict. A use has been found for every part of the fruit. In fact, while meat packers claim to use everything about the pig but its squeal, the citrus industry can go even further since the orange or grapefruit has no squeal to be wasted.

Of course some citrus products and by-products are of greater value than others in the war effort. Seed oil, for example, is not being produced to any great extent at present, although prewar experiments showed that citrus seed oil could be used in the textile industry in place of cotton seed oil.

The concentration of orange and grapefruit juice is probably the greatest innovation that war has brought to the citrus industry. This is not a new idea. Concentration experiments have been going on for twenty years. But it was not until after Pearl Harbor that

large scale production of this product got under way.

Before that time growers were much more concerned with marketing their fresh fruit. Indeed, they were a bit afraid of what might happen if the public became accustomed to eating its breakfast grapefruit from a can, or pouring its orange juice from a similar container.

When war made every inch of shipping space precious, canning and concentration was the only answer. While the juice content of citrus fruit varies in the different citrus-growing states, it has been roughly estimated that all the nutritive values in thirty carloads of oranges can be transported in seven cars if the juice, only, is canned. If it is concentrated, only a single freight car is needed.

But growers' fears were not the only cause for prewar distrust of concentrates. Early experiments employed high temperatures that impaired flavor and destroyed vitamin content. More recent research has developed a vacuum-process method to produce a concentrate that retains all the vitamins, minerals and flavor of the fresh fruit.

The manufacturing process for orange or grapefruit concentrate is relatively the same. First the fruit is thoroughly washed. Then the juice is extracted by rotary presses. From the presses it flows through stainless steel pipes to 500-gallon holding tanks where, by means of a de-aeration process, all the air is extracted. Next, the juice is pumped into a series of high vacuum pans where water is removed under greatly diminished pressure. The use of decreased pressure allows evaporation at a much lower temperature, thereby preserving flavor and vitamin content.

One does not usually think of oranges and grapefruit in terms of machines and industry, but many plants such as this work on a 24-hour schedule to turn out products from citrus fruits. These include juice, oil and pectin. When these values have been extracted the residue is dehydrated and made into cattle feed, one ton from each ten tons of citrus waste.



When the process is complete, the juice has been changed into a heavy golden syrup. The concentrate is packed in gallon cans, cooled in refrigerated rooms to 45 degrees, and is then ready for shipment. If stored at 35 to 40 degrees, Fahrenheit, it will keep satisfactorily for two years.

Known as an eight-to-one concentrate, the golden syrup needs only the addition of seven parts of water to be returned to its original state. Its nutritional value is the same as that of fresh fruit.

Under the lend-lease program, thousands of gallons of citrus concentrates have gone to the civilian populations of our allies. Few British children have ever seen an orange or a lemon, fewer still have seen a grapefruit. Yet most, if not all of them, have tasted orange juice, poured from a bottle into a spoon like cough syrup or other medicine.

The bottled concentrate, its golden color showing from behind a green-and-white label, is strictly rationed in England and is distributed only to expectant mothers, convalescents, and to children under five. The proper dose is listed on the label: a teaspoonful twice daily for babies up to six months old; three teaspoonfuls a day for children six months to five years of age, and for expectant mothers, one tablespoonful a day.

Pectin and peel oil are also important wartime citrus products, the latter being used extensively in soft drinks and for flavoring, both in this country and abroad through lend-lease agencies.

In a way, pectin is the Cinderella of the citrus by-products. For more than a century pectin, extracted from the peel of apples, oranges, lemons and grapefruit, has been used in making jelly jell. Now pectin has come out of the kitchen and may become a real life saver.

As early as 1775 pectin, in the form of scraped raw apple, was used as a remedy for diarrhea. Later it was employed in the treatment of other intestinal diseases. Within recent years, scientists have found that specially-prepared pectin could be used as a blood plasma substitute.

Hundreds of men on the world's battle fronts are being treated for shock and for severely-bleeding wounds by the injection of blood plasma into their veins. Many lives

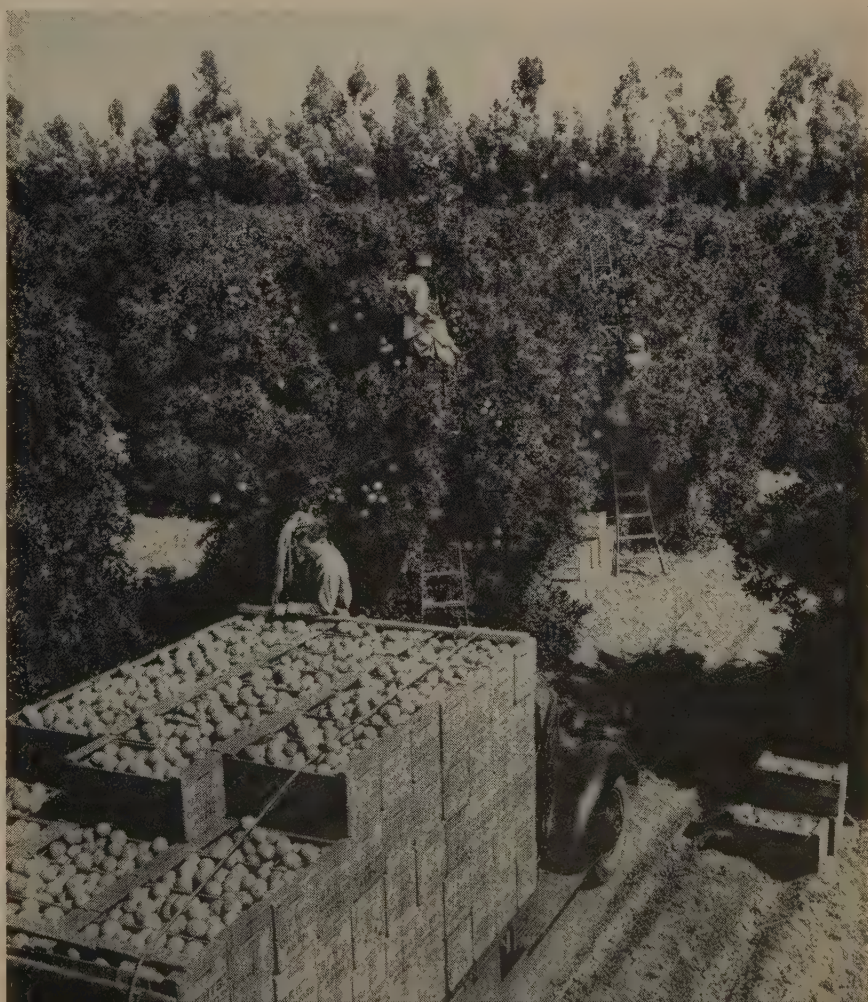
Workers gathering the fruit in an orange grove are doing a valuable war job. Military medical discoveries have substantiated many facts about the value of citrus products. Certain amounts are necessary in the diet of the fighting man.

are being saved. But the store of blood plasma is not too great—it can be supplied only by other human beings. Thus, while pectin has not yet come into widespread use as a blood plasma substitute, it may yet be hailed as a great, life-saving find.

Tests made in the Cook County Hospital in Illinois, and at the Henry Ford Hospital in Detroit, indicate that pectin, obtained so easily from citrus fruit peel, may be the answer to the surgeon's need. Dr. F. W. Hartman, in describing the use of pectin solutions at Henry Ford Hospital, said in a recent article that they "have been used in 125 clinical cases as a substitute for electrolyte solutions, blood and blood plasma, in the prevention of shock, with satisfactory results."

In addition to being used in shock cases, pectin is also used in helping blood coagulation. People known as "bleeders," who suffer from a disease called hemophilia, in which the blood does not readily coagulate, cannot be operated upon under ordinary circumstances. However, after receiving a series of pectin injections for a few days, a "bleeder" can undergo an operation without any more than normal hemorrhage.

In powder form, pectin is also useful in stopping the flow of blood when applied directly to wounds. Dentists have found that a plug of cotton saturated with pectin will stop hemorrhage following tooth extraction when all other reagents fail. In case of minor cuts and light hemorrhages, a little dry pectin under



a pad of cotton will, as a rule, quickly stop the bleeding.

Of course when pectin is to be used for medical purposes, either as an injection or directly in powder form, it must be carefully refined. It is produced as a white powder that does not require refrigeration. The powder readily dissolves in sterile water or saline for transfusion purposes.

Research based on wartime needs has brought about the discovery of other uses for pectin. A sodium pectate medium has been found that can be used as a substitute for agar, which the Japanese, in pre-war times, supplied for use as culture media in bacteriological laboratories.

Citrus pectate—which is a chemical cousin of pectin—in pulp form has proved experimentally effective in cooling steel rapidly, with less cracking and at a lower cost than other cooling materials. Pectate also has the ability to “cream” rubber latex in the fabrication of rubber articles, but use in this case will, of course, not be widespread until postwar times when the rubber shortage is ended.

Researchers have also developed a pectin spray that can be applied to paper or cardboard to make them impervious to grease or petroleum. Pasteboard “cans” treated in this manner may be used in the place of glass or metal containers.

Another pectin product can be used as an anti-stick, to keep gummy materials such as asphalt or rubber latex from clinging to the sides of their containers.

Tons of marmalade base have been shipped to England since the war began. The British, as everyone knows, are extremely fond of their afternoon tea—complete with bread and jam, or crumpets and marmalade. When the war cut off Great Britain’s normal supply of Spanish oranges, citrus fruits from America were promptly substituted through lend-lease agencies. Citrus pulp was shipped in fifty-gallon barrels to England and there it was mixed in the proportion of sixty per cent grapefruit to forty per cent orange, to give the finished product the bitter taste that Britons prefer in marmalade. One barrel of pulp will make approximately two and one half barrels of marmalade.

In the early days of the citrus canning industry, the

problem of how to dispose of waste peel and pulp was a difficult one. Then, some seventeen years ago, scientists found that the dried peel of oranges could be used as cattle feed. More recently, other scientists found that dried grapefruit peel also could be used. Today the demand is greater than the supply.

The use of citrus waste for cattle feed is especially important right now, when food has become such a vital part of our wartime economy. The United States

and her allies need meat and grain. Humans and animals are, in a way, competing for the same corn and wheat. Thus, cattle feed made from citrus waste can ease the strain on our farms and stock ranches.

Cattle feed made from citrus waste is especially important in Florida, for that state, although few people realize it, ranks third high in the production of cattle in this country. Florida is not a grain-raising state—there are no wheat fields and few corn fields within her borders. But thousands upon thousands of acres are devoted to citrus, and from citrus also comes cattle feed. Florida cannot produce enough of the latter to meet her own needs in these wartimes. The citrus feed industry is important, also, in Texas and in California.

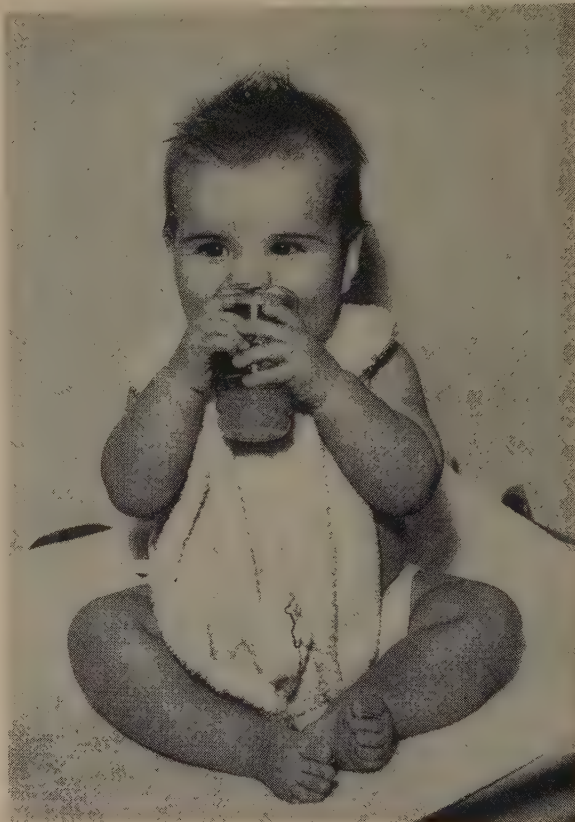
In transforming cannery refuse into cattle feed, the

material is chopped up, sprinkled with lime, and allowed to stand for a time before the juice is squeezed from it. It is then dried and bagged in powder form. Sometimes black strap molasses and minerals are added. The average yield is one ton of feed from eight to twelve tons of wet citrus waste.

At the present time the juice squeezed from the pulp is discarded. However, experiments now under way indicate that this material can soon be used commercially in the production of feed yeast, which would add much nutritive value to the dried pulp feed. It can also be used as food for human beings.

Other experiments with waste juice from the presses have dealt with the production of industrial alcohol. Research and experimentation have shown that twenty-five gallons of pressed juice will yield one gallon of 190 proof alcohol. However, despite the great demand for alcohol in the manufacture of war munitions, little has been done with this phase of the citrus industry.

(Continued on page 276)

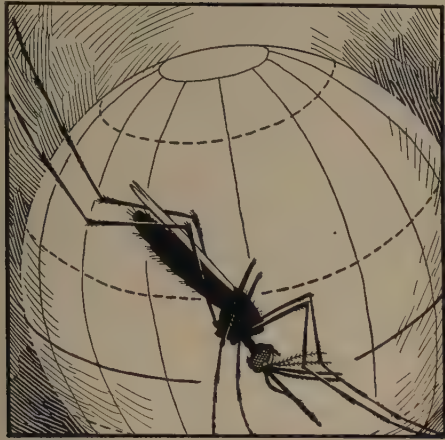


“Bottoms up”, says this little beauty as she smiles over the glass of orange juice. She does not know it but its vitamins are vital.

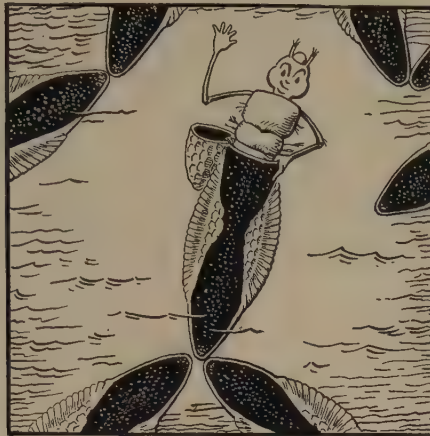
Imogene Anopheles

By GARNET W. JEX

A picture story of the malaria-carrying mosquito, how she lives and works and how the menace that she holds must be met in man's interest.



Imogene, mosquito villainess of our story. Anopheles is her family name. Her relatives lurk in many lands.



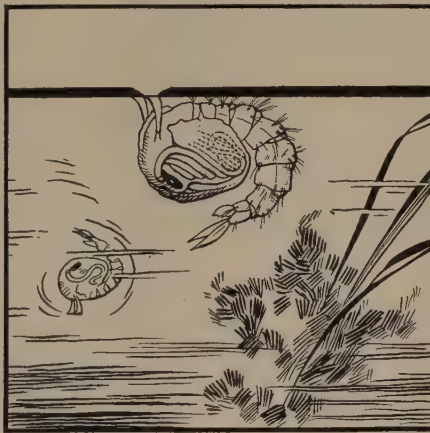
Imogene's mother laid her on a pool of quiet water, one of a pattern of many eggs. In this cradle she hatched into . . .



. . . a wriggler. Playfully she scooted backwards, gobbled food, or rested just beneath the surface while she breathed.



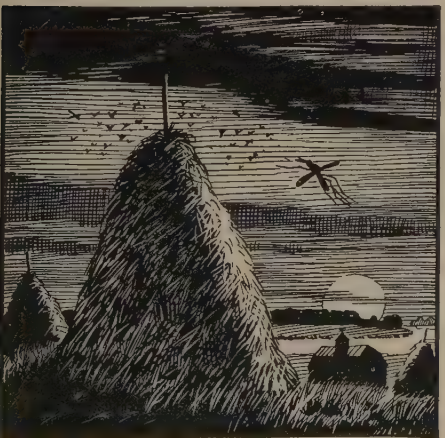
Every few days Imogene outgrew a new dress and discarded it. Then, an adult fourth-stage larva, she changed into . . .



. . . a tumbler who breathed through strange trumpets, dived and loafed about. It took about two weeks from the egg until . . .



. . . she emerged on the surface as a mosquito — homely, limp and wet. It was only a short while before the air dried her off.



Imogene tried her wings. They worked. She flew off to join other mosquito boys and girls in the twilight games of Mosquitoville.



The buzzing troop had great fun as it swarmed over haystack, bush and mound. Adolph was there. Two hearts beat as one.



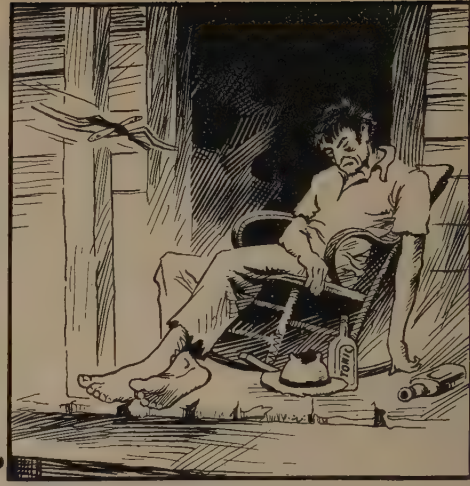
Truth was, Adolph proved an awful sissy. He wore fancy plumes and he meekly sipped sweet nectar and the juices of plants.



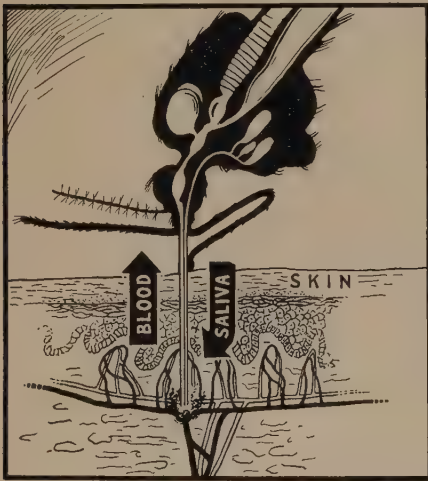
But Imogene loved him and then motherhood approached. She needed food for her eggs. She became a demon that flew at sundown . . .



. . . thirsting for blood — any blood. She sought it anywhere within her range of flight. She sought it from man and animal alike.



Imogene was no respecter of persons. She did not hesitate to take the blood of this poor, sick man — blood that was host to malaria parasites.



Almost standing on her head, as is the custom of her Anopheline clan, we see Imogene performing one of her most villainous roles as . . .



she plunges her marvelously efficient beak into the man's skin, gorging. Then she flies drunkly away. In another two weeks she is . . .



. . . bloodthirsty again. The malaria parasites are now transformed within her stomach. They could have made a sick man of this strong one.

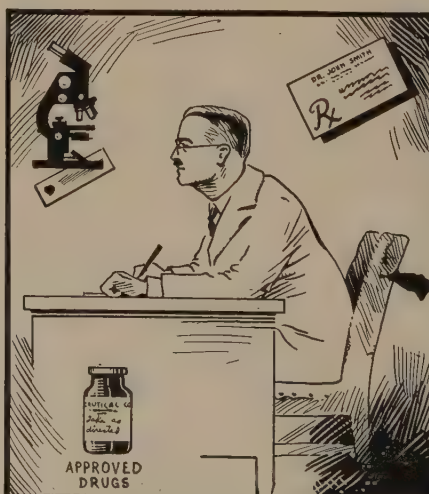
Criminal at Large!

Imogene Anopheles
WANTED DEAD ONLY

Reward Offered :-

RESTORED HEALTH OF INDIVIDUAL & COMMUNITY UNTORMENTED EVENINGS NO CHILLS • NO FEVER VITALITY	ECONOMIC REHABILITATION WORKERS FIT TO WORK IN MALARIA SEASON BETTER CROPS BETTER HOMES
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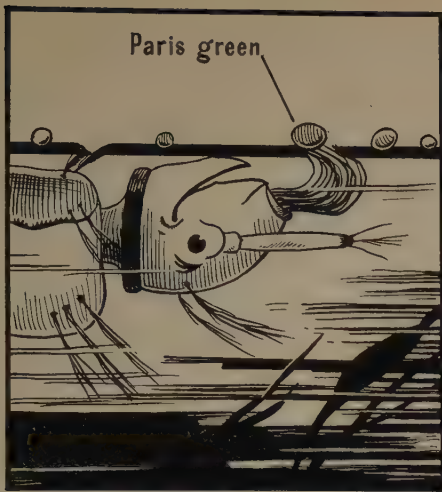
But he, and all other smart people, are on guard. He means to keep well. He has been warned against Imogene's depredations.



Whenever Imogene leaves malaria in her parasite-filled saliva while sucking new blood, it is a matter for the doctor. He takes over.



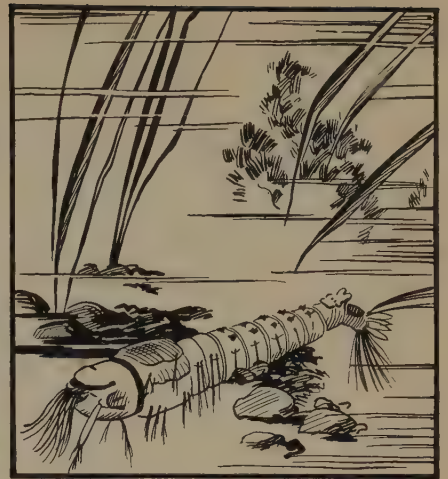
And the engineer and the entomologist know what she is up to, also. They are mobilized to exterminate Imogene and her kind.



Draining swamp and pond made homesites for Imogene and her kind scarce. Or, Paris green, like particles of food, floated on the water.



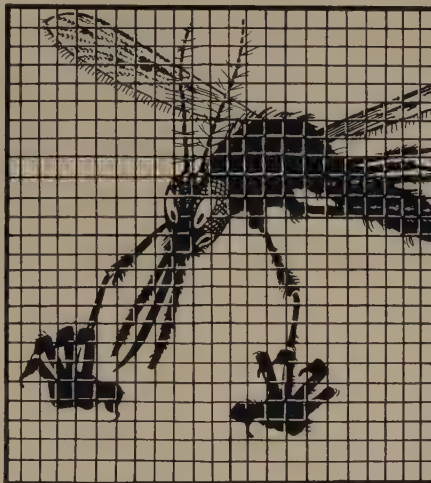
Imogene's wriggler children brushed this into their greedy mouths. Immediately it scorched their little gullets; scorched them good . . .



. . . and before you could say Adolph Anopheles, these wrigglers flopped to the bottom. They were quite poisoned—in-deed, quite definitely dead.



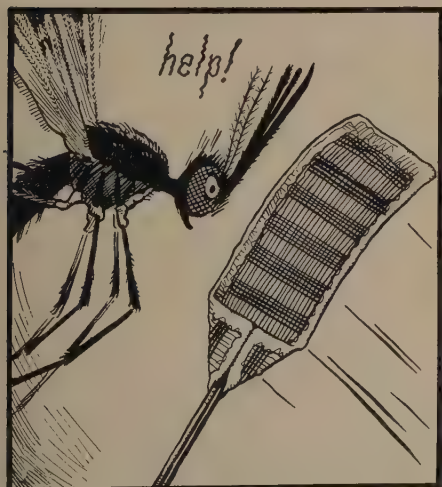
Oil may clog the breathing tubes of the wriggler, or larva-eating fishes, planted in the water, will gobble him up, as man practices biological control.



Meanwhile Imogene, famished still for blood, buzzed on her way. She found many sources of meals safe behind screens of windows and porches.



She found many people surrounded by an odor that sickened and discouraged her. She could not know that they were repellents. She hated them.



Other people swished at her with swatters, which mashed her quite flat and put an end to her blood-thirsty career and her buzzing.



Yes, and people vigorously sprayed at her with nauseating clouds. All hands were against her. For all her cunning . . .



. . . Imogene could not match her wits in places where people are determined to keep well. So she died, defeated by knowledge.



Roland Tiebor and his trio of sea lions—Dolly, Johnny and Frisco. It takes from one to one and one-half years to train a sea lion to perform the most elementary tricks, and about three years to teach one a tune on the horns.

*Patience and kindness are necessary in training
the sleek speedsters of the ocean to be—*

Sea Lion Prima Donnas

By CLARISSA LORENZ

ONE night after a performance in the circus, Lily, the sea lion, became frightened by the stamping and trumpeting of elephants, and bolted from her tank. When the trainer saw her slithering through the dark, he picked up a bucket and began banging on it with a club. Perhaps he had read about Pavlov's experiments with dogs. Anyhow, it worked. Like a laborer in the fields harking to the dinner gong, Lily was lured back to her habitat by the sound she associated with food. And she got a midnight snack of fish.

Once a circus performer, always a circus performer. A lost, stray or stolen sea lion eventually finds its way back to the big tent, especially if it is within earshot of a steam calliope or the band. In fact, sea lions exhibit all the characteristics of old troupers—soaking up applause and admiration like prima don-

nas. From tail-tip to snout they are seven feet of showman. If somebody else steals their act, they are resentful. As star attractions at any circus, they are entitled to temperament. After all, sea lions are only human!

Have you ever watched a sea lion in its native element? If so, you have seen something approaching an aquatic ballet. His speed is phenomenal. In the Pacific, where he has been timed, he was found to do eighty-eight miles an hour. He is the most graceful swimmer in existence. The poetry of his movements, his timing and control, are beautiful beyond description. After careening in a great circle and arching high through the air in a curve, he will enter the water so smoothly that there is hardly a ripple to be seen. He will thread his way with incredible speed between rocks and over obstacles. He can stop at a

split second, his soft nose one inch from some jagged rock. Using depth for a speed-gathering run, he rises from the water to amazing heights, gauging his landing so perfectly that he will alight on a given level looking as though he had been there all the time.

The sea lion's favorite game is hide-and-seek. He will lurk two feet below the surface, rolling his eyes after the fish that is dangled above, and quite sure that he is invisible. After rising with a rush of lightning to seize the fish high in the air, he falls back with gurgles of pleasure.

If that whiskery brown face sticking up from the pool at the Zoo does not remind you of an elderly clubman, at least he behaves like one. He will sleep twenty-four hours at a stretch, snoring away; he is very inquisitive; he sheds his coat every spring; he shakes his head rapidly when pleased, and shivers when he is frightened. Sudden sharp noises, like fire alarms or fireworks, scare the wits out of him.

Captain Roland Tiebor's famous trio of sea lions—Dolly, Johnny and Frisco—were once playing in a circus that included a pig act. When one of the pigs got loose and ran down the Hippodrome track into the ring, the sea lions started after it in hot pursuit. They were caught before the pig could be reduced to pork.

Captain Tiebor claims that his trained sea lions can run nearly as fast as a dog—at least for about 150 feet—and, what is more, will chase a dog. They do this mostly as a lark. But when threatened, they will defend themselves quite ably.

A tramp once amused himself on the circus grounds by poking a stick at a sea lion while the trainer's back was turned. But the sea lion needed no protector. He began chasing that terrified tramp around tent poles and over circus gear until he had caught up with his persecutor. And then he bit, tore and twisted the britches right off him.

These sleek, stream-lined performers are a great responsibility. Although, untrained, they cost from \$75 to \$200, they are worth anywhere from \$2000 to \$5000 once they have become a drawing card in the big tent. Training starts at about eight months. A wise

Dolly does the flipper stand, a feat that is said to be her exclusive accomplishment among performing sea lions. She also juggles a ball while doing this trick. Dolly had to know her trainer for four years before he could start her on this stunt.

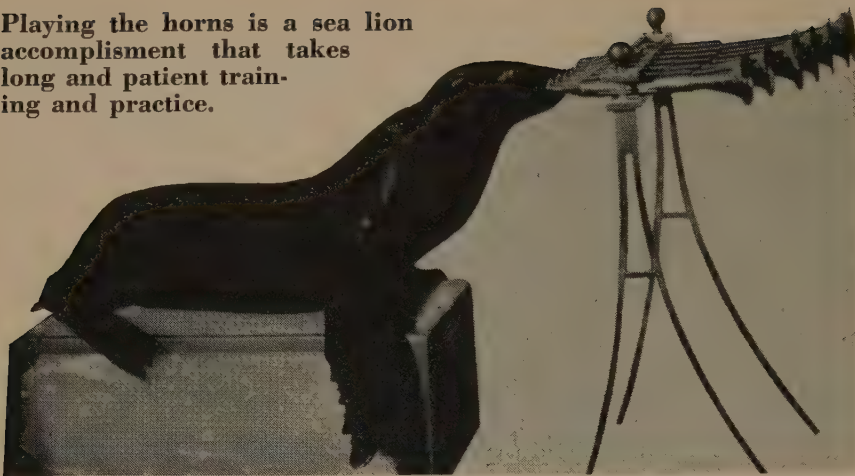
trainer never slaps a sea lion. Their feelings are easily hurt. A cuff on the ear or a cross word may discourage a sea lion forever. The trainer gets results only with kindness, which wins their confidence. "I first teach my sea lions to love me," says Captain Tiebor, "before I even begin training them. They must then learn to understand every word I say to them." Sea lions are taught by example, and, according to their masters, it is considerably harder to train sea mammals than land mammals. A lion, tiger or puma can only be bullied into doing tricks.

You have, no doubt, seen these sleek circus performers shoot the chutes, come down a ladder, dance the rumba in a straw skirt and ruff, ride a kiddie car, pull themselves along tight ropes, walk on clogs, smoke a pipe, salute, perform military drill, fire cannons, mimic the hum of an airplane, or bark out phrases like, "I want my Mamma!" Balancing is the trick they do best, whether it is open umbrellas, nursery balls or dumbbells. And the longer the snout, the better the performer. Watching them, one may not realize how many months—even years—goes into the preparation of these tricks.

It takes from one to one and one-half years to train a sea lion, green out of the ocean, to do the most elementary trick. Dolly, who weighs 180 pounds, does a flipper stand on Captain Tiebor's hands while juggling a ball at the same time. She had to know him four years before she was ready to learn this trick. And it took him even longer before he got



Playing the horns is a sea lion accomplishment that takes long and patient training and practice.



Frisco to do the muscle grind. She is said to be the only sea lion in the world who can do this trick, which consists of hanging on the trapeze bars by her front flippers, spinning around for from fifteen to twenty revolutions, and then jumping down and bowing to the audience. At first she could never remember that she was suspended in mid-air. Her front flippers would be wrapped around the bar when some noise or sudden movement would distract her, and she would let go.

Teaching sea lions to blow the horns is also a complicated business. In some shows, the horns are electrically connected, so that the performer has only to hit them to produce sound. But Captain Tiebor's horns are not wired. The sea lions have to do their own blowing. It takes about three years for one to memorize a tune. First he is shown how to blow through his nose. Next he applies this technique to the horns. Then he is taught the whole piece by watching his trainer point to the various horns, each of which has a different pitch.

"They get so they understand every word I say," Captain Tiebor declares. "They'll never forget a trick, although they may get out of practice. If they're told to perform a difficult one, they sometimes try to sneak out of it by playing dead."

Rehearsal for sea lions lasts usually an hour—from 10 to 11 in the morning and again from 4 to 5 in the afternoon. Just before the performance they limber up. Half an hour previous to her appearance on the stage, Red, the lady sea lion in Ringling Brothers Circus, abandons herself to a kind of dreamy Yogi exercise, slowly weaving back and forth. She poises a long time on her front right flipper, with her head thrown far back until the snout touches it, then resumes her normal position again. This routine is interrupted only when she has an itch to scratch.

The sense of timing of a sea lion is flawless. Once they hear the bugle in the main tent, they know to a split second just how long to wait before going on. And at the sound of that bugle, they plunge into the tank, uttering hoarse cries of *ook-ook* and *wark wark*, which seems to "get them in the mood."

If the previous act runs overtime, they will fidget and fret, highly nervous with impatience.

Sea lions are perfectionists. If one of them misses a trick, the others will rush up and grab the faulty actor. Captain Tiebor has turned this characteristic to advantage. In one act he has Johnny blow the horns first and pretend to miss, whereupon Frisco, who is always into everything, sneaks up and quickly blows three or four notes, then waddles off and lies down to applaud her own performance. That always lays the

audience in the aisles.

The career of a sea lion lasts from eight to twelve years, although some of Captain Tiebor's pets have been performing for seventeen years. But after a decade of circus life, they may develop cataracts and grow blind. They have a habit of turning their heads suddenly, striking their protruding eyes against a wall or other obstruction.

Not all of these sightless mammals are pensioned off. One blind sea lion was kept on the pay-roll for five years. When the circus played in a theatre, his trainer led him from the dressing-room up several flights of stairs and through several doors. Ever after that first evening, that sea lion would lead the others from the dressing-room to the stage. He had memor-



Frisco does the "muscle grind," hanging to the bar with her flippers and making fifteen to twenty revolutions.

ized every step of the way. He could not perform all the tricks his colleagues did, but he was right on the spot waiting for his cue when it came time for him to act. He was a fast horn blower and excelled in playing "My Country 'Tis of Thee." He would place his snout along the instrument until he could feel the starting note. The audience never knew he was blind!

Sea lions are delicate and catch cold easily. In extreme weather they are kept warm with oil heaters. And, like us human beings, they sometimes get bilious attacks. When a lobster proves indigestible, or a bad fish has given him ptomaine poisoning, he is dosed with Scott's Emulsion and raw egg. Ordinarily his diet consists of about ten pounds of fresh herring or mackerel a day. He likes beef liver as well as shellfish.

"People around here don't realize it," said one trainer, "but I work twice as hard mentally as others do physically, just worrying about these animals. You've got to watch them every minute, especially on the road, where they're likely to get skittish." Their flippers are so close to the ground that they are likely to step on a nail or sharp stone. When Captain Tiebor's sea lions were performing in London, he used to take one out for a walk as a publicity stunt. When the traffic bobby saw a sea lion wearing a sandwich-board reading "I'm out for my morning constitutional," he stopped all traffic in amazement.

Coming back from England, the steamer on which Captain Tiebor and his six sea lions were passengers ran into a storm just off the Grand Banks. The mammals had a special compartment, with ocean water pumped into good-sized tanks. But one of them began behaving queerly. He would lie down, groan, and then get up and waddle over to the rail. If Captain Tiebor had not been sure that sea lions do not get seasick, he would have suspected the worst. Anyhow, he asked the captain of the ship to come down and look at these strange antics.

"Why, that animal's seasick," said the captain.

"It was a new one on me," the trainer says, still finding it hard to believe. "After all, there they were in their natural element. It didn't seem possible!"

Some sea lions make good patients. A female sea lion, whose front flipper was once smashed in an accident, meekly held it up while the trainer cut off the shreds with scissors. And when the wound had to be cauterized, she made no protest. But others have to be put into strait-jackets. "If Frisco ever had an accident," said Captain Tiebor, "she wouldn't let me come near her. She'd think she could fix herself up."

Nevertheless, perfect rapport exists between this trainer and his mammals. In the morning, he has only to cough or clear his throat and his pets will start barking in their tank. They know the sound of his footsteps, even when he tiptoes around the cage, which is boarded up at night. "And I can tell by the way a seal barks what he's thinking about," he says.

Captain Tiebor maintains that the last thing they ever think about is to return to freedom and the sea. Years ago, the Tiebors were showing their mammals in the West, where the circus grounds happened to be located near a lake. By way of an experiment, Tiebor, Senior, dumped them all into this lake. They swam around for about five minutes and then were seen no more. Young Tiebor, who was fourteen at the time, felt very sad about it all. He was sure he would never see his beloved creatures again.

"Well," said his father casually, "let's turn and walk away."

The minute they did so, those sea lions shot up out of the water and followed their masters back to the show grounds. As Captain Tiebor remarked, "Why should they want to go back to their past life? Here in the circus they've nothing to worry about. They get regular meals, they're treated well, and they love their work!"

Sea lions are only human!



Dandelions

By DONALD MILTON HEIN

So often I have wondered
What dandelions are;
Which wealthy seraph squandered
Coin blossoms from some star?

Are these bright, golden speckles
Of non-metallic sheen
Just eighteen-karat freckles
On earth's complexion green?

Or are they fruit of sunbeams
In concentrated spots
To hem Spring's gown with gay seams
Of yellow polka dots?

And when their bloom grows hoary
Seed heads aren't what I see,
But flower souls in glory
With halos, haunting me.



Cinder cones south of Kanosh in the southwestern part of Utah. The large cone in the foreground is Black Rock Volcano, a particularly symmetrical and interesting formation.

Desert Cinder Cones

By JOHN LINDSEY BLACKFORD

GAZING across the pale, detrital plains of the Southwest, toward baked, barren, and weirdly-colored mountain slopes, no more unique "prop" to complete the alluring stage of the desert can be conceived than the graceful silhouettes of its cinder cones. Steep-pitched against the purple of distance, they trace these far horizons indelibly on the memory.

One evening the sight of two perfect cones south of Kanosh, Utah, drew my car irresistably to the side of the road. Above sage and juniper their subtle slopes curved to a purpling sky. An aura of evening light glowed about their truncate peaks. Black, uncanny shadows hastened down and away from dark, cindery sides, while silken clouds floated in the deepening sky beyond. The nearer, yet still mysterious cone, was Black Rock Volcano. It seemed to demand more than a scientific explanation.

Yet across northern Arizona, through southwestern Utah, into the buff and gray desert basins of the Mojave in southern Nevada and adjacent California, may be seen a wide scattering of these cones. They are conclusive evidence that our planet suffered minor "skin troubles" throughout this entire area in the not far distant past.

A cinder cone builds up around an explosive-type

volcanic vent. Not infrequently they may follow upon an earlier and quieter discharge of lavas, being erected upon the latter in a final explosive effort. Cooling fragments of lava—lapilli, ash and cinders tossed out with eruptive violence—pile up steeply around the orifice. Being rough and angular, such material maintains a high, picturesque angle of repose; and thus are created those steeply curving, scenic contours that so captivate the eye. On the broad floors of valley-basins, or mounted upon the strange, chocolate-colored desert ranges, their conical forms are startling, and sometimes fantastic.

Where eruption and ejection are brief, lasting but a few violent hours, or perhaps days, only a cinder mound of low, broad outline will hump its curving black heap about the old center of disturbance. On the other hand, when the subterranean forces are of major proportions, and when they mingle vast cinder explosions with extensive lava flows, towering majestic cones of the composite type are erected. These we know as the world's mighty volcanoes. Such a condition, of course, save in limited areas such as that of the San Francisco Peaks, has not been the story of our Southwest. Usually we find a picturesque pimpling of the earth's crust, a minor affair in the history of Vul- (Continued on page 276)



Mother wood thrush at her nest in the syringa bush. At left, the blind, naked quartet are new from the eggs. Right, mother has just alighted on the edge of the nest, and pauses a moment on the alert as she surveys the situation. While incubating, the mother was not assisted by her mate, but with four hungry mouths to be filled at frequent intervals, daddy wood thrush lends a helping hand.

The Wood Thrush Arrives

By JULIAN BURROUGHS

Photographs by the Author

WHEN the wood thrush arrives in the mid-Hudson Valley the buds on the apple trees show red. Warblers are going north. It is time to shorten up the lines on one's shad net for fish now nearer shore. It is a most thrilling time of year! I am always on the alert, listening for that first note of the thrush, a silvery, almost spiritual song that stirs a deep, emotional chord in me. As Walt Whitman expressed it, it "filled our senses, our souls."

Among all our song birds there is not one as wholly honest as is the wood thrush—as serene, as trusting. More, the wood thrush seems to feel that everyone else is as honest and trustworthy as he is, for the pairs not only build their nests—to hold their treasure of four blue-green eggs—openly in the fork of a sapling,

but they often use a conspicuous piece of white paper as a foundation. How misplaced is their trust! Not once have I found a nest of the wood thrush in the woods or thicket that was not plundered by some predatory bird or animal. I have heard other observers say the same. Therefore it was a real joy to me to find that a pair of thrushes had begun to build a nest in a syringa bush near my own nest. Soon the home, built mainly of dead grass with some mud added as reinforcement, with a few dry leaves instead of paper as foundation, was complete. Four eggs were laid and incubation began. It was both my determination and my pleasure to see that this nest, at least in so far as it was possible, came to no harm. I almost stood guard over it, having no end of fun talking to the

brooding thrush, telling her all the news, slowly gaining her confidence. Cats and red squirrels I kept away. How well the trust repaid me, both in pleasure and in the photographs the pair let me take! Although I never saw the male, with his beautifully-speckled breast, sitting on the nest to incubate the eggs, he did his full share in feeding the young birds. Not only that, but much of the time his joyous song rang through the foliage.

Many ornithologists have commented upon the fact that in a nest of young birds so often there is one more advanced, apparently older, than the others, and sooner ready to fly. It was so with this nest of young thrushes. One day I found one of them standing on the edge of the nest, overlooking his brothers and sisters, his short tail giving him a bobbed-off, comical look. I knew, then, that they were ready to leave the nest at any disturbance—at any carelessness or any quick movement on my part. So I set up the camera with caution, moving slowly, silently, hardly daring to draw a full breath, because I know that no matter how tame the parents have become, the young are instinctively fearsome, as is true of the majority, at least, of young birds. And once they spring out of

Mother seems about to settle over her brood for a few minutes' rest as she is caught in the act by the camera.



The four youngsters nearly ready to leave the nest, and unanimously hungry. One parent is just visible.

the nest in headlong panic, they can never be put back or made to return to it. I was anxious to get a picture of the male feeding them, his snowy breast, with its dark brown speckles, showing. Very soon he came with food, the shutter clicked, his picture was taken. A few hours later the young left the nest, scattering throughout the surrounding shrubbery.

Although with many birds it is the female that is shy and timid, the male being bold and fearless, with the wood thrush I have found the mother more trusting and tame and unsuspicious than the male. Often when the mother thrush will sit on the nest or go about her occupation of feeding the young with serene, unruffled indifference to both the photographer and his camera, the male will be much disturbed. He will scold angrily and snap his beak, with the feathers on the top of his head standing straight up. It was, therefore, an extra satisfaction to get not only a good picture of the young thrush, in almost full plumage, ready to fly, but one of their handsome father feeding them.

A few weeks later there was a new or second nest begun a short distance away in another syringa bush. Although the first nest had (Continued on page 276)

*Songs of forest and field, sounds of
the sea and wind, have meaning and are—*

Yours for the Listening

Illustrated by Else Bostelmann

By J. CHARLES TRACY

ONE of the earliest recollections of my boyhood in Philadelphia is of being awakened at dawn by the care-free notes of a cardinal, calling from the honeysuckle thicket just outside my window. Year after year my cardinal, or perhaps one of his progeny, was on hand to announce the sunrise to a generally uninterested world. On a spring morning he would bid me come out and share his place in the thicket, or, if it was a school day, he would transfer me from sleep to those delicious moments of light that are the genesis of day. By his tones he would tell me whether the day was bright or gray; whether the snow was falling, or the blood-root was bowing in the April woods.

Now, a long time away from these scenes, I can listen to a redbird sing, and be carried back to the place where I first met him. And when I search for him afield, it is not the brilliant flash of red that dances through the brush for which I seek, but the song by which I know him. If a cardinal will not speak, I can introduce myself and he will answer.

How meaningless would Nature be without her many voices! By the first robin song in April, the droning bees of summer, the crows cawing from the frost-covered grain fields, or the tinkling of the tree sparrows on a winter morning, we are reminded of the seasons, and even to what degree they have advanced. By the screaming of terns that play above the surf, the dreamy whistle of the meadowlark, or the loon's shrill laughter, we are recalled to places we have loved, and scenes we knew.

There is no place in Nature that cannot be identified by its characteristic sounds. During summers spent on the New Jersey coast, the ceaseless pounding of the sea was ever the dominant voice. When the



"Year after year my cardinal, or perhaps one of his progeny, was on hand to announce the sunrise to a generally uninterested world."

bluefish were running, I would compete at sunrise with the ospreys for a morning catch, and wonder why so large and strong a bird could do no better than a plaintive whistle to express itself. At this early hour the yellowthroats were already brewing their "witchery" from the bayberries, the males perched atop the low bushes like little masked bandits of the brush. Although these handsome little warblers are at home wherever there is marshland or damp meadow, their enchanting song of sorcery is as much a part of the seaside symphony as the surf itself.

In the salt marshes bordering the bay, the distant surf provided a soft background to the whistle of the sea-born breezes as

they rustled through the marsh grass and cattails. A liquid, musical gurgle betrayed the presence of the marsh wren, and the seaside sparrows exploded in subdued song as they popped up momentarily from the reeds, only to disappear again like tiny feathered porpoises playing in a vast sea of grass. Where the reeds grew tall I could be sure of discovering a pair of redwings. I always think of the song of this dapper resident of the salt marsh as the very essence of the seashore. Whenever I hear his lazy, wheezing "zhree-e-e" I can close my eyes and relive the hours spent wandering through his maritime domain.

Springtime exerts its influence on humanity in a great many ways. To some, it means an opening of doors and a cleaning of houses. To others it may mean a winter overcoat to be discarded or a long-awaited chance to get outside and root in a cheerished garden. In the world of Nature, spring is a time of awakening and rejuvenation, a time when adventurous flowerlets take heart to push their tender shoots above the protecting earth, and the instincts

of the birds steer them once more toward their summer homes. Spring is the overture to the concert of summer.

When March has been transformed to April, the starlings cease their aimless chattering and settle down to talk seriously about the weather. We see them sitting in groups of ten or twenty atop a budding tree, busily discussing a pair of industrious robins on the lawn below. Their squeaks, croaks and absurd whistles are as sure a sign of spring as any that has yet been devised, and serve as an excellent tuning-up for the orchestra of native feathered migrants that soon will follow.

Before the multitude arrives, there are those early travelers, the robins and grackles, and those who have spent the winter in the north—the cardinals, titmice and song sparrows—to keep us informed that a new season is with us. When the chilly dawn-winds play across the meadows and the first shafts of gray light pierce the early blackness, it is the robin who calls upon the sun to arise. The cardinal takes it upon himself to announce the event to the awakening world, like the newsboy screaming headlines on a street corner. Throughout each day as spring advances, we hear some new note floating on the refreshing air, until at last the crescendo “teacher, TEACHER” of the oven-bird comes to us from the misty woods on a May morn. I have never seen an oven-bird that appeared to be *arriving* from anywhere. For nonchalance and industriousness he has no peer among the birds. You find him stalking about on the leaf-strewn forest floor. He looks up at you, as much as to say, “Don’t be silly. I’ve been here all winter!” Then he waddles off among the May-apples and disappears, the very symbol of avian permanence. It is only natural that his song should be equally symbolic of the permanence of spring.

Early January, one year, brought an unexpected flood to our valley. It was, for the most part, checked by man-made dikes, but there were parts of the valley that did not escape the rushing waters. One of these was the airport near our home, and when the crest of the flood had passed I visited the spot to see what had become of its resident birds and mammals.

The grasses that had been growing in the fields were slicked down with ice like a man’s hair, and



“Where the reeds grew tall I could be sure of discovering a pair of redwings.”

everywhere there was a thin ice-coating that cracked and fell with every step. After the waters of the river had reached their crest the temperature had dropped and frozen the very top layer of water in these invaded fields. When the flood subsided, the crust of ice remained, hiding the furrows of the fields. A light snow had fallen during the night, but the ice had kept it from the ground and below the crust was just brown mire.

After many days’ absence, the sun was shining again in the valley, and the fast rushing waters of the river had lost their ominous portent. But, notwithstanding the brightness of the day, the fields were desolate. There were no juncos buzzing about the water’s edge, and the flocks of goldfinches and tree sparrows were no longer busy gathering seeds from the weed-patches. Finally a red-tailed hawk appeared, sailing across the fields. He landed once upon the ground, then took off again and made his way to a tall tree, where he could better survey the situation. Across the river another perched, and the two

exchanged greetings, albeit without much enthusiasm.

One spot along the river’s edge is high enough to avoid flooding, and there the footing was easier, for the crust of ice was left behind. In the brush on this high spot a song sparrow chirped a doleful tune, as he scurried about trying to find anything with which he might stoke his near-empty furnace. Odd, I thought, that in such country as this, with almost the bleakness of the Arctic, a song sparrow should be the only small bird about instead of one of some more northerly tribe, such as a tree sparrow. But there he was, his black triangle displayed proudly and to all appearances just as unconcerned about the weather as if it were mid-May. Occasionally he would land on an ice-coated branch, and slip ridiculously off into a pile of snowy flood-debris.

On my return across the fields, the crust of ice was higher, and the footing treacherous. In some places the ice covered a peculiar formation of icy-crystals that broke into a thousand pieces when stepped upon, tinkling like tiny bells as they scattered over the ground.

A strip of brown weeds that remained above the ice-level held a high-pitched (Continued on page 276)



Silhouette of two prairie chicken cocks as they appear on the horizon at daybreak. This is the way the birds are most easily spotted after the booming ground has been located by the sound of the booming.

Prairie Chicken Panorama

Text and Pictures by Charles and Elizabeth Schwartz

A thrilling sight on the prairies of Missouri is that of prairie chicken roosters silhouetted against the sunrise as they carry out their elaborate courtship ritual. From early spring until the middle of June, these birds gather daily in small flocks on selected spots known as booming grounds.

It is the resonant call of the roosters that gives to the booming ground its name and attracts the attention of the countryside. As the bird produces this wierd booming noise, which can be heard for about a mile, he looks like a hobgoblin. Long feathers, which normally lie along his neck, are erected over his head like horns and expose two clear areas that distend like small orange balloons. His eyebrows

become very prominent, their brilliant orange color matching the balloon-like air sacs on his throat. Sometimes he stamps his feet up and down rapidly in a dance preceding this booming performance.

One of the main activities on these booming grounds is the establishment of rather elastic individual territories, which each bird defends from his neighbors. Each territory serves as an area where the rooster carries out his courtship and mating. Regular cock fights are waged over these boundaries, but they usually turn out to be games of bluff. The birds will oppose each other, utter loud cackles, rush madly until they come beak to beak, then, as suddenly, they may stop and settle down to talk it over. Occa-

A prairie chicken rooster performing the nuptial bow before a hen. He bows low before her with his wings outstretched horizontally so that they touch the ground. His pinnae are raised over his head, his tail spread in a fan, and he booms as he bows.





In the background and out of focus is one of the nets used to trap the birds on the booming grounds. Those that are caught are banded and released after pertinent data have been recorded. (Left) Prairie chickens in an elm. If frightened from the booming ground, the birds often retreat to the closest trees to feed on the buds and wait until the disturbance is over. In winter, when snow is on the ground, the birds use the trees a great deal.



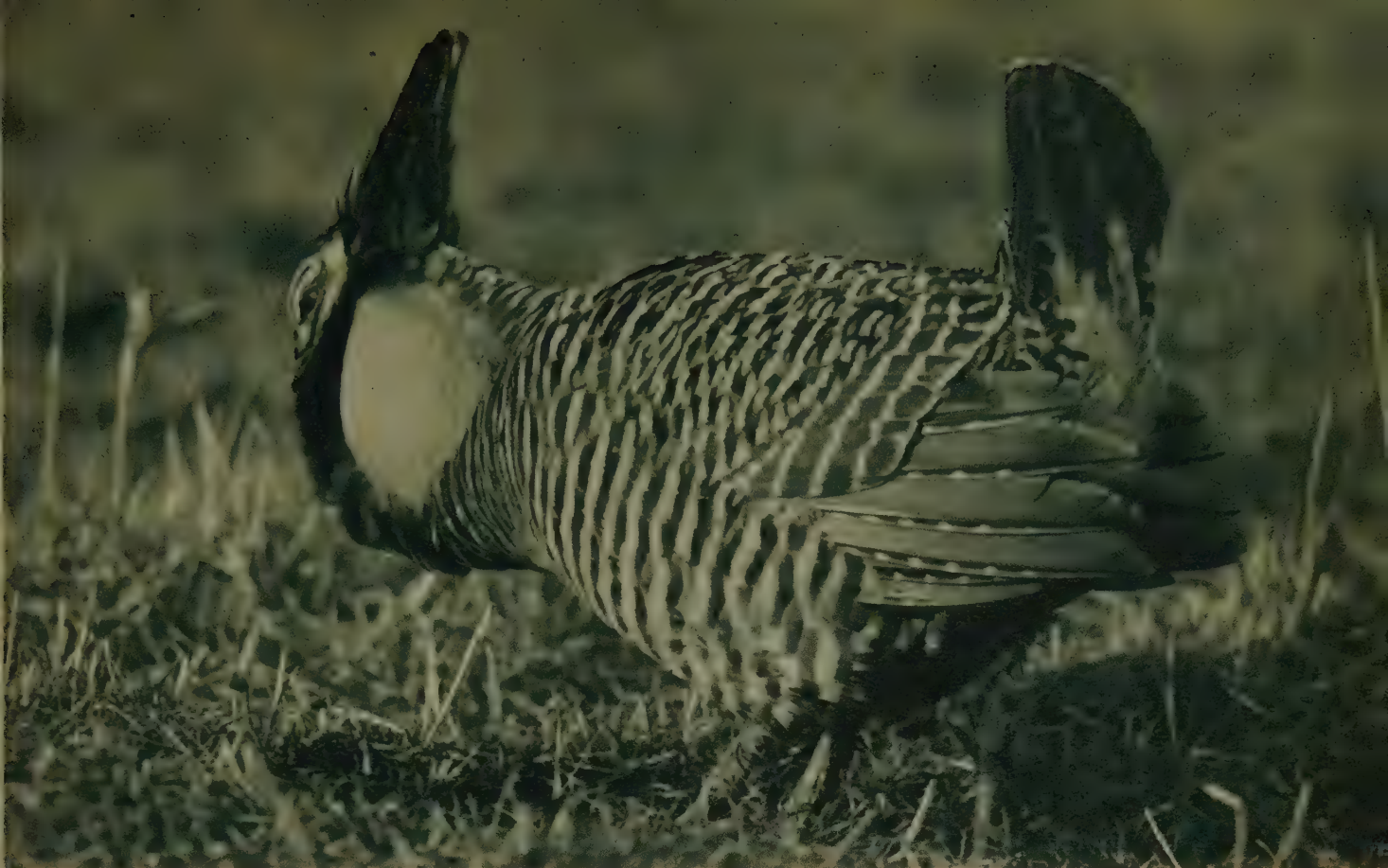
sionally one bird will jump in the air and attempt to strike his opponent, but the most severe casualty inflicted is the loss of a few feathers.

Hens are infrequent visitors to these stag gatherings except for about a week at the height of the season. At this time mating takes place. The males outdo themselves in their booming before the females. In contrast to the pompous males, the females are quite demure and shy, and are coy and indifferent to the strutting cocks. However, occasionally a hen will favor one of her suitors, and her acceptance may be very formal. The rooster will bow low before her, with his wings outstretched horizontally, so that they touch the ground. She may signify her acceptance by returning this nuptial bow, also stretching her wings sideways—a fitting climax to this elaborate courtship.

Some booming grounds are used year after year, but others are abandoned because of land-use changes or fluctuations in population. The same birds probably return day after day, and even season after season, as is indicated by the behavior of certain banded roosters. In addition, they may even take up the same territory on the booming ground day after day. In the spring, as many as forty-two males have been seen on one ground, although ten or twelve are more common. These numbers have been found to vary with the population density in a

During the height of the booming season in spring, hens appear on the booming grounds as a flock. They wander among the males, who stay in their respective territories. Six hens are in the photograph. The roosters outdo themselves in their attempts to attract the hens to their territories. The roosters at the extreme end of the booming ground do not have any hens as yet.





given area from year to year. In the fall there is a revival of booming, but it is not as regular as in the spring. On certain fall booming grounds as many as one hundred birds have been seen daily over a two months' period.

Prairie chicken nests are located in a variety of places but the hens apparently prefer ungrazed to lightly-grazed pastures. Protection is given to the nest by the camouflage of the hen. So perfectly does she match her surroundings that it is very difficult to locate a nest even if it is clearly marked. Nesting takes place from the middle of April until early June.

A portrait of a booming cock. His "feathered leggings" are wet from the morning dew. Sometimes the birds jump as much as four feet off the ground (left, below). The jumping rooster is about to strike his opponent and rival with both feet and wings. Right, below, is an alert cock in the fall of the year. Note that the throat is not swollen as with the booming birds in the spring. Also, the eyebrows do not show up in the picture as they would at booming time in the spring.

The chicks are precocious, leaving the nest about an hour after hatching. They are greenish-yellow with black spots. Hatching occurs around the last of May and the chicks stay with the hen most of the summer.





The markings of the prairie chicken blend so well with their habitat that it is indeed difficult to find a hen on the nest. Even though the cover may be sparse one can view the nest from just a few feet and still not detect the hen as long as she remains motionless.

The birds stay in seclusion during the summer, spending most of the day in cool spots, such as the shade of a tall cornfield. They come out in early morning and evening to pick up a meal of insects, indirectly benefitting the farmer by destroying large quantities of insects that attack his crops.

In the fall, the chickens become more wary. Their protective cover is lower and they are more easily seen. It is characteristic to see a bird with its neck stretched like a periscope as it looks over the top of a ridge.

During winter, both roosters and hens are found in the same flock, which sometimes contains as many as 250 birds. They spend most of the day loafing and sunning in trees or on southern slopes. At night, they roost on the ground.

Formerly the prairie chicken was an abundant bird throughout its range in the middle West. But, about the turn of the last century, it became sadly depleted. Probably the biggest factor in the immediate reduction of the birds was excessive and promiscuous hunting for market and sport, with little regulation by law, and lack of enforcement. The other important reason

for their near extinction was the agricultural trend. The prairie chicken is a native of the grassland, and with the inauguration of an intensive cropping system, which did not favor this grassland, their range was destroyed in many places, leaving the birds with no place to live. Recently, however, the tendency in many agricultural sections has been to allow some of this cropland to revert to grassland. This, together with the sorely-needed protection now being given, has allowed the birds to hold their own in places, and even slowly increase from their once decimated ranks.

The eastern race of our prairie chicken, the heath hen, furnishes a classic example of man's extinction of a once abundant bird. This bird ranged farther east in the United States, but because of the same causes that reduced our prairie chickens in the middle West, the last heath hen died in 1931 on Martha's Vineyard, an island off Cape Cod. The heath hen was a race of the same species as the greater prairie chicken. Other races, Attwater's prairie chicken and the lesser prairie chicken, which are found in the southwestern United States, have suffered a diminution at least as severe as the northern prairie chicken.

A baby prairie chicken chick, the first one of the brood to hatch. The chicks are most precocious. Within an hour from the time they have hatched they will be running around catching insects. The chicks stay with the mother through the summer.





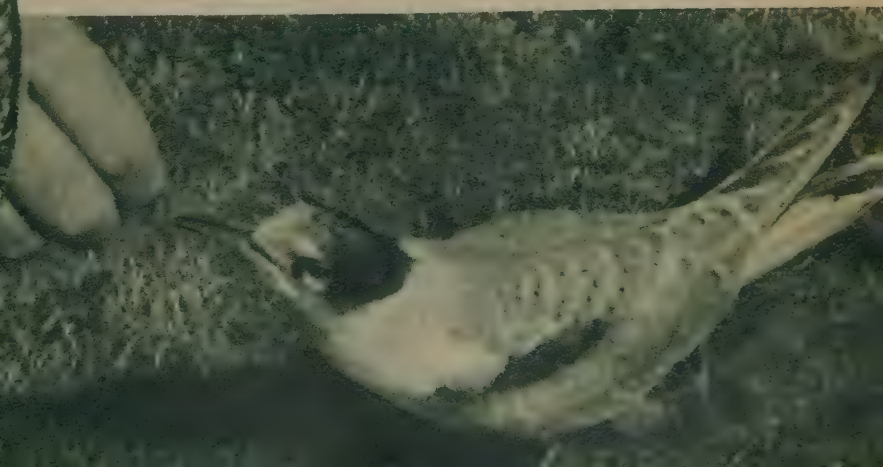
A Good Tern

By MARGARET L. PERRY



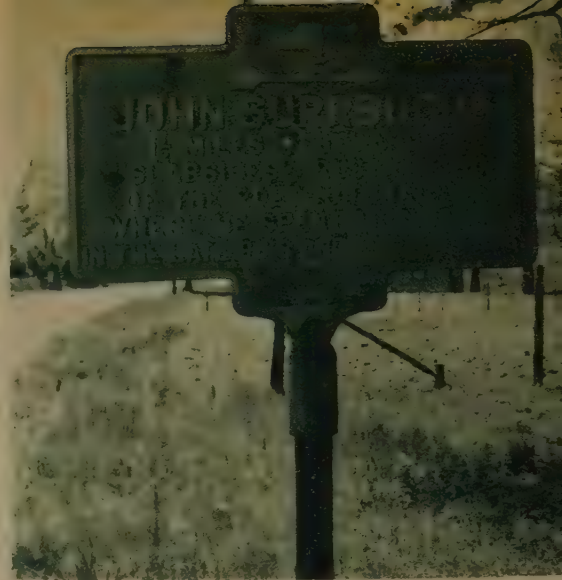
A handy camera was kept busy recording the story of a common tern that was raised by hand in New Brunswick, where its parents were summer visitors. The eggs of the bird are greenish-white or brownish, and spotted with brown or black. This makes them difficult to see in a nest of sand, seaweed, dry grass and chips. The baby tern photographed in the hat was ten days old. It was fed bits of fish or meat, bread and milk, and water, but much preferred the fish. The two young birds were photographed when four weeks old, just after they had been for a swim and were drying out on a rock. They made no attempt to swim away. Bits of down still clung to their heads. They still made no attempt to feed themselves.

At five weeks the tern had a wingspread of $24\frac{1}{2}$ inches, the wings seeming to grow rapidly and out of proportion to the rest of the body. At eight weeks it came to be fed by the young master of the house, and at nine weeks it still returned to be fed by hand. Although the bird spent its nights and most of its days down on the river, it made a half-dozen visits a day to the kitchen door in search of handouts. It would join us at our swimming and gladly consent to being picked up and brought home to tea. It seemed equally happy to return to its river.





Slabsides, the famous writing retreat where John Burroughs spent much of his time in later years, is now maintained as a public memorial to one of America's most widely-loved Nature writers. Unchanged is the desk in The Bark Study at Riverby, Burroughs' home on the west bank of the Hudson. The water-smoothed stones, the papers, the magazines, the guest-book remain just as they were at the time of Burroughs' death in 1921.



Highway sign at West Park, N. Y.

VISIT TO SLABSIDES

John Burroughs, beloved American writer of Nature books, died in 1921. Twenty-two years later, in 1943, more than 100 visitors—people who had read his books and who came to pay his memory homage—journeyed singly or in small groups on a pilgrimage to Slabsides. This cabin amid the woods and hills, a mile and a half from the village of West Park, N. Y., is maintained by the John Burroughs Association as a public memorial. Burroughs built the two-story rustic structure on the edge of a highland meadow or bog in the late 1890s. For about a quarter of a century it provided him with a writing retreat.

An earlier retreat, The Park Study overlooking a wide arm of the Hudson at "Riverby", Burroughs' home at West Park, is just as it was when Burroughs died. During a recent visit, I found the pictures on the walls, the



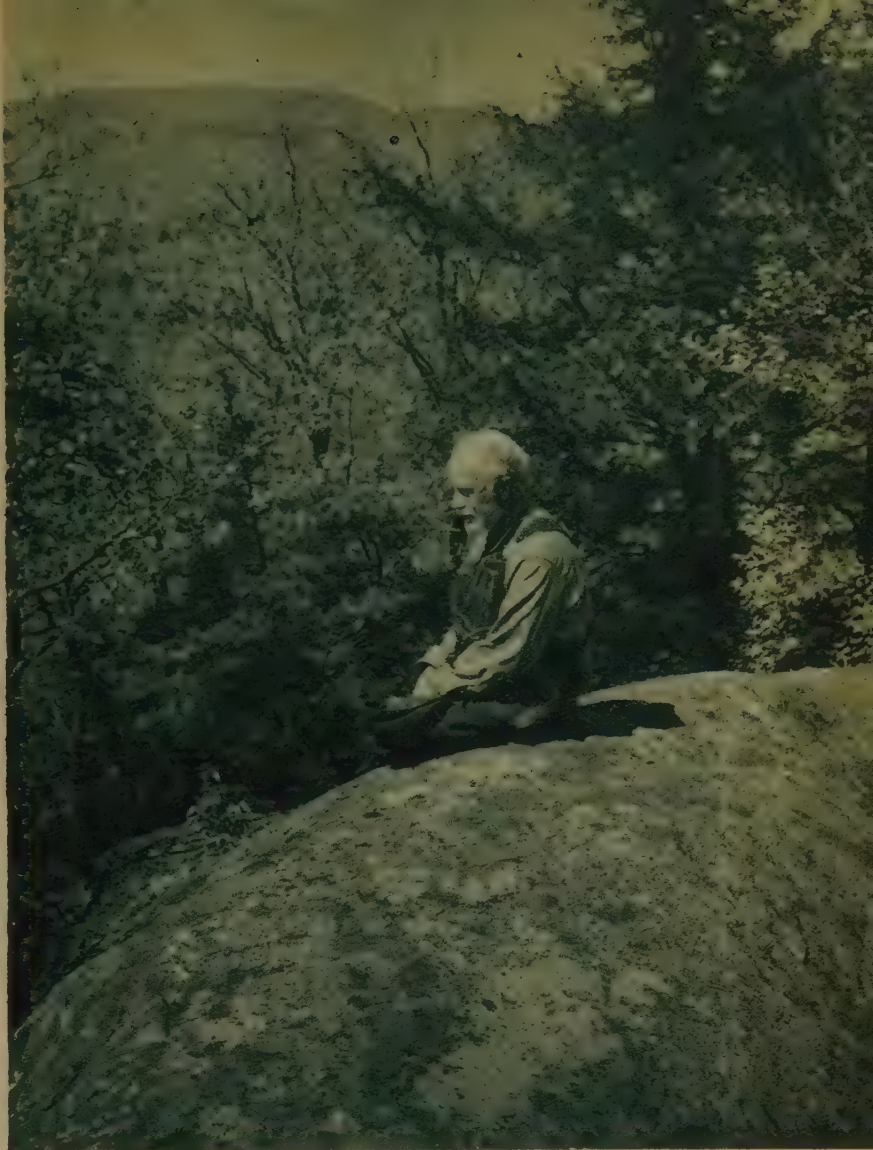


Rock ledge of ravine near Slabsides.

By EDWIN WAY TEALE

books on the shelves, the small bust of Ralph Waldo Emerson on a corner stand, just as they had been when Burroughs was alive. The magazines were for 1921.

Slabsides, too, remains virtually unchanged. The spring, the rock-walled ravine beyond the meadow and the granite promontory—called Julian's Rock—which towers above it, are all as Burroughs saw them and described them. It is thus particularly appropriate—at this woodland cabin where time seems to have stood still—to see hanging on one wall of the room where Burroughs wrote many of his classic pages of Nature prose, these lines written by Jean Dwight Franklin in honor of one of John Burroughs' later birthdays: "Away with clocks and sundials. Time and I have made a compact. This to be my boon. To hear the evening thrush and know the hour; yet feel it noon."



Julian's Rock, which towers above the open space where Slabsides is situated, was named for the author's son, Julian Burroughs, shown here resting on the high granite promontory. The Bank Study, at Riverby, was John Burroughs' first writing retreat. In the late 1890s, he constructed Slabsides in the woods a mile and a half west of the Hudson. There he entertained Theodore Roosevelt, John Muir and other distinguished naturalists of the time.





Loyal to her task of motherhood, the grasshopper sparrow sits on her nest, unmindful of the camera that was two feet away, and thus yields up a rare bird portrait. Deep in the interior of the grass-lined nest were four eggs, basically clear white but sparingly spotted and speckled, chiefly around the larger end, with black and delicate lilac-gray.

Grasshopper Sparrow

By GEORGE A. SMITH

When a friend, who is quite an authority on sparrows, first called my attention to that shy little bird of the fields, the grasshopper sparrow, I confessed that I had been hearing its insect-like call of Zee-e-e-e-e-e-e-e summer after summer without knowing it was the song of a bird. Once acquainted with this bird, I was determined to find its nest and add the sparrow's picture to my collection of bird photographs. My friend warned me I should expect disappointment.

In a grassy meadow, however, I found a grasshopper sparrow that sang its buzzing song every afternoon from atop a thistle near the bank of a small stream. Through field glasses I discovered that the bird would invariably dive from the thistle into the grass when its song ended. Using the plant as a central point, I patiently worked my way around it in increasing circles. On hands and knees I examined and followed through every tiny pathway in the grass until I finally located the sparrow's nest.

Since the female was incubating her eggs, she sat until I parted the grass within a few feet of her. Then she fluttered away, dragging her wings as though disabled. The nest was at ground level, cleverly hidden under an arch of grass. My next challenge was to obtain a good close-up photograph of the bird on her nest. I decided to work my camera by remote control. Carefully parting the grass in front of the nest, I set up the camera at about two feet. A flash bulb operated by synchronized control was directed on the nest and covered with a handkerchief to diffuse the light. A fishing line attached to a home-made lever device was stretched to about one hundred feet.

After waiting patiently to allow the mother to return to her eggs, and then checking to be sure she had, I made two exposures. One added the grasshopper sparrow's portrait to my collection. I definitely consider it my masterpiece.



As We See It



Waterfowl Regulations

With the northward migration of waterfowl under way, Federal authorities are taking their first steps toward the drafting of the migratory waterfowl hunting regulations for next fall. In the meantime the pressure is on from various quarters for marked liberalization of the rules, in light of the "great numbers" of birds now using the flyways.

As a groundwork for the drive to let down the bars there has been much publicity about the estimated 150,000,000 waterfowl population, which is claimed to be "about the same number as we had in 1900." Ducks Unlimited, conservative for once, estimates 125,000,000. Many have wondered about the basis for the 1900 population figure, because this was long before the need for such figures was realized, or the regulation of shooting by international treaty considered. We have learned that the 150 million estimate was made, not in 1900, but about 1929, and seems not to have been published until 1942. It is now cited in contrast with the estimated 25,000,000 in the dark days of 1932, and 38,000,000 in 1937.

Experienced field observers, realizing how difficult it is to estimate continental waterfowl populations, are seldom disposed to question total figures, but those who have vivid recollections of the great waterfowl flocks of the early nineteen-hundreds find it impossible to believe that the ducks are now as abundant as they were forty years ago, and consider it dangerous policy to publish such statements.

There has been considerable publicity about the damage to crops by concentrations of waterfowl, a condition that does and always has existed in some places, its seriousness now being accentuated by the world demand for food. The impression is also spread that hunting pressure is low because of lack of ammunition, and of time to spend in duck blinds. The facts, however, do not indicate any important lessening of waterfowl hunting.

Encouraged, however, by this alleged overabundance, demand is being made for removal of the ban on live decoys and baiting; for longer seasons; for an increased bag limit. A bill has been introduced in Congress seeking to permit by law the use of not more than six live decoys in front of any blind. Such a measure, taking a part of the regulations out of the hands of the agency designated by the Migratory Bird Treaty Act to draw up the recommendations—the Fish and Wildlife Service—is bad practice and

should not even emerge from legislative committee.

For some reason that eludes us, the Outdoor Writers Association of America has chosen to inject itself into the formulation of waterfowl regulations. Of course, this organization, dominated by rod and gun editors, is mainly responsive to gunner interests. However, we find it difficult to place much confidence in the "expertness" of a special committee of the OWAA that "studied" the regulations and recommends basic revision. The organization, in a resolution adopted at its recent Columbus, Ohio, meeting, pledged itself to "plausibly assert and forcibly maintain these declarations for the rights of American sportsmen." Choice of the word "plausibly," to wit: "superficially worthy of belief"—is hardly happy. There has long been a surfeit of plausible writing about conservation.

At a conference on waterfowl held at the Columbus meeting, Federal authorities were urged to have a set time for opening and closing the shooting day, instead of sunrise and sunset, and to permit use of live decoys. There was some sentiment for baiting under "strict supervision"; for an open season on swans; for increase of the bag limit from 10 to 12. There was definite demand for a season that would give all sections of the country shooting when the ducks were on hand. A 90-day season was urged by some.

Federal officials attended the meeting, heard the recommendations of all sorts and quite properly committed themselves to nothing. They will listen to the recommendations of state game officials, try to arrive at a figure for the existing population, consider breeding conditions in the North and promulgate a set of regulations that they hope will be "fair" to both birds and gunners, if such a paradox is possible. There is a considerable sentiment that urges creation of a "backlog" of migratory waterfowl against the return of our fighting men to the duck blinds. Whether they will bring back an insatiable desire for more killing remains to be seen, but gunners and arms and ammunition manufacturers are confident that the army of sportsmen is going to be swelled by hundreds of thousands. We are not quite as optimistic—or, better, pessimistic. In any event, we do not believe that the wild waterfowl population is yet at such a figure that it warrants resumption of the many destructive practices of the past. We will, however, hear many arguments from some duck hunters for the return of some of these.

Nature, as though ashamed of man's folly, attempts to erase the scars of war, as with the—

Wild Flowers in the Dolomites

By EDITH A. PIOTROWSKI

A FOUR-HOUR drive northward from Venice, Italy, through the Cadore Valley, brought the traveler, in happier days, to the heart of the Dolomites. By less than half that time he should have inhaled the sweet, invigorating air of the mountains, a decided contrast to the summer atmosphere of the canals in Venice, especially at low tide.

The Dolomites, constituting about one-fifth of the Tyrol, extend eastward for fifty miles from Lake Garda and cover an area of about two hundred square miles. The region is named for the French geologist, Monsieur le Comte Déodat Sylvain Tancrède de Dolomieu, who first described the Savoy Alps as of magnesium-lime formation, since called dolomite.

In the fateful summer of 1939, weary of the war tension everywhere prevalent on the continent, I made the short journey from Venice to Cortina d'Ampezzo to lift my eyes to the mountains. Within an hour of Venice I could see the foothills shrouded with a blue haze, reminding me of the mountains of southern California on warm days. Then Mt. Antelao and the Cadorini came into view, promise of the glories ahead.

To an Italian acquaintance who had urged me to visit Cortina, I wrote, a few hours after my arrival there: "For once realization exceeds expectation. The boisterous



The pale yellow flowers of edelweiss are set in a star-like whorl of white and downy leaves.



Anemone narcissifolia is a tall plant of the high meadows, its white blossoms with yellow centers. *Pulsatilla vernalis* has rich purple flowers that also have hearts of gold.



Boite River, scrambling madly over boulders, reminds me of the foamy streams of the Sierra Nevada. From my hotel windows I look out upon peaks that rival the Canadian Rockies in awesome majesty. As for color, nowhere else have I seen mountains streaked with blue-black and mottled with yellow blotches, neighboring others as red as the reddest in the far reaches of Yosemite Park." Later I learned that the various hues are due not only to the peculiar lime formation but also to the many-colored lichens that cover and soften the rocks. The effect was lovely at all hours. But at sunset, especially after a showery day when the clouds caught in their white folds the reflections of sun and mountains, even the faces of the people in the streets of the quaint town took on something of the glory of transfiguration.

As the Dolomite area belonged to Austria before the first World War, many of the inhabitants are of Austrian blood and are blond. On my first evening in Cortina, while strolling on the high road that leads to Bolzano, I met a fair botanist laden with dark red columbines. To my delight she could speak excellent German and fair English. From her I learned that in the Tyrol the sub-Alpine zone reaches to about 4700 feet, the Alpine to 6000, and the high Alpine to the everlasting snows. Above 5000 feet there are no



Golden down covers the stem and white petals of *Anemone vernalis*, lovely alpine plant.



Campanula barbata is known as bearded harebell. Alpine anemone is white tinged with a pale purplish-blue.



flowers before June, although many of the early perennials form their buds beneath the snow. Generally the flowers are large by contrast with the diminutive plant, because of the character of the soil and the abundance of moisture.

My new acquaintance identified the two dominating peaks overlooking Cortina as Cristallo (10,495 feet) and Sorapis (10,595 feet) which, as we talked, took on varied hues in the intermittent cloudiness and sunshine. From her also I first learned about the beauties of Lake Misurina as she pointed across the green Ampezzo Valley and said, "That is the road to Tre Croci and Lake Misurina." It was not long before I boarded the bus that daily rattled up that road.

It is less than an hour's ride from Cortina to Tre Croci Pass, situated at 5930 feet. To our left, as we climbed upward, the hulking mass of Mt. Tofana rose like a huge red wall, 10,635 feet high, while, to our right, Piz Popena reared to an altitude of 10,310 feet, and three groups of needle crags pointed skyward, reminding me of the Pinnacles of the Sierra Nevada. From Tre Croci we had magnificent views of the whole craggy Sorapis and Marmarole ranges.

The inn at Tre Croci will always be associated in my mind with the edelweiss, for it was there that I first saw this strange plant, which grows in the Tyrol only at altitudes above 5000 feet. In story and legend it is plucked only by those with the climbing ability of a mountain goat, but I was told that it can be gathered in many places in the Dolomites without the slightest risk. In fact, the plants that I saw had been found growing in the meadows and rocky slopes just above Tre Croci. Although its German name means "nobly white," the flower itself is small, yellowish, and lacking in fragrance. The whorl of oblong leaves, which form a star around the yellow blossoms, is whitish, however, and, as in the case of the poinsettia, is generally mistaken for the blossoms. The stalk, whitish and woolly like the leaves, averages about six inches in length.

From Tre Croci one drops quickly to Lake Misurina, a purple gem that in color and setting—at 5760 feet—reminds one at once of Canadian Lake Louise. From the hotel veranda I looked across the beautiful pine-bordered water to the rocky mass of Mt. Sorapis beyond, with the sun glistening on its small glacier and playing along



St. Bruno's lily, *Paradisica liliastrum*, is often mowed with hay in Alpine meadows.



Purple-tinged white cups of *Crocus vernus* appear soon after the snow melts. Alpine clematis is a climbing plant.

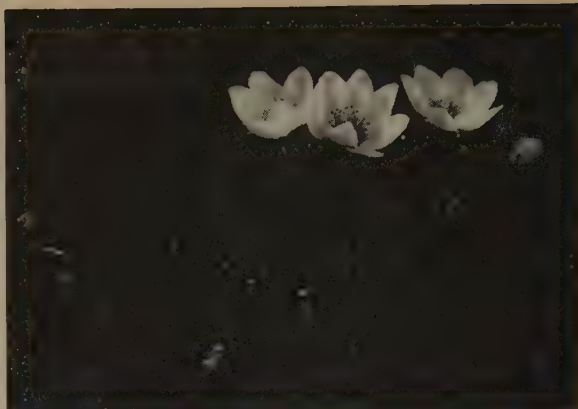


the whole length of the Mar-marole range. Only two of the towers of the Tre Cime are reflected in the lake as the third is hidden behind a huge mass of rock rising from the Forcella di Lavarredo.

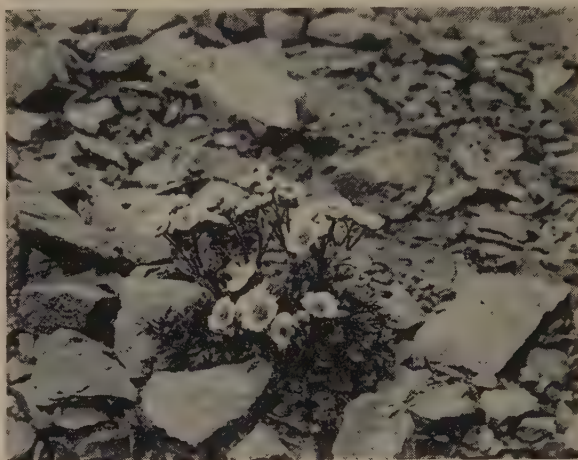
At Lake Misurina it was my good fortune to make the acquaintance of Dr. Laszlo and his wife, Dr. Pauliczky Lászlóne, botanists and amateur photographers from Budapest, who were familiar with the flora of the Tyrol and generous with their pictures. They told me that I was too late to see two of the truly glorious sights of the Tyrol. The first, they said, is a mountain pasture thick with the beautiful St. Bruno's lily, glittering snowy white in the sunshine. The second, they said, is the miracle of the Alpine anemone or windflower taking possession of a mountain slope as the snow melts, forming a new mantle of white, tinged with pale purplish-blue. But I did see in profusion the little globes of fluffy seed masses, commonly called chamois' beard, which the Alpine anemone bequeaths to the long summer days.

Another anemone, *Pulsatilla vernalis*, popularly known as the shaggy pasque flower, appears in the pine forests with the early white crocus. Its thick white petals, tinged with pink, are covered on the outside by long glittering tufts of golden silky down. Although both anemones and buttercups belong to the crowfoot family, the former are distinguished from the latter by having no true petals. The most interesting of the Alpine buttercups, *Ranunculus glacialis*, lives in a higher and more desolate region than any other flowering plant. As high as 13,000 feet one finds it at the edge of snow patches, with its pinkish white corolla suggestive of apple blossoms miraculously scattered among the stones and fissures.

On a dazzling morning soon after my arrival at



Mountain avens, *Dryas octopetala*, is a shrubby creeper growing in rocky meadows. The petals are creamy-white, stamens yellow.



The pink, fringed blossoms of *Ranunculus glacialis* grow as high as 13,000 feet, higher than any other flowering plant of the Tyrol.



Monk's hood or *Aconitum napellus* grows in damp, rich soil around Alpine sheep folds and dairies. Bees provide its fertilization.

Lake Misurina, Dr. Lászlóne suggested that I might like to see flowers growing in trenches of the first World War. Thus it was that I made the journey with my new friends to Monte Piana by way of Col Sant' Angelo. As we climbed upward we could hear the musical tinkling of little bells and see the small tawny figures of cattle grazing in the meadows below. On the slopes beside us were large scabiosas, alpen-rosen, purple thistles, Queen Anne's lace, and buttercups. Over the shrubs and around the trunks of many pine trees twined the most beautiful of the Ranunculaceae, the purple-belled Alpine clematis, the only real climbing plant of the Alps. All around us chickadees foraged and twittered in the pines until we passed beyond the trees to a large grassy plateau strewn with square blocks of rocks of an odd formation. Near the summit we found in abundance a creeper of the rose family, *Dryas octopetala*, commonly called mountain avens. It is a shrubby plant, with anemone-like creamy white flowers and leathery, shiny-notched leaves that are white and downy underneath.

The whole top of Mt. Piana is gutted with World War trenches, in one of which the remains of a combatant had been found only the day before our visit. Rusty tin cans, barbed wire, and shapeless weather-beaten shoes lay about in profusion, and over and among these reminders of death, the true Alpine forget-me-not, *Myosotis al-*

pestris, fittingly spread a bright blue shroud. Signs indicated the respective positions of the warring Austrian and Italian forces, not more than two hundred yards apart.

Around us towered snow-covered peaks. To the south we could see Mt. Christallo's huge buttresses and jagged turrets, with beautiful Piz Popena's single tower rising majestically (Continued on page 276)

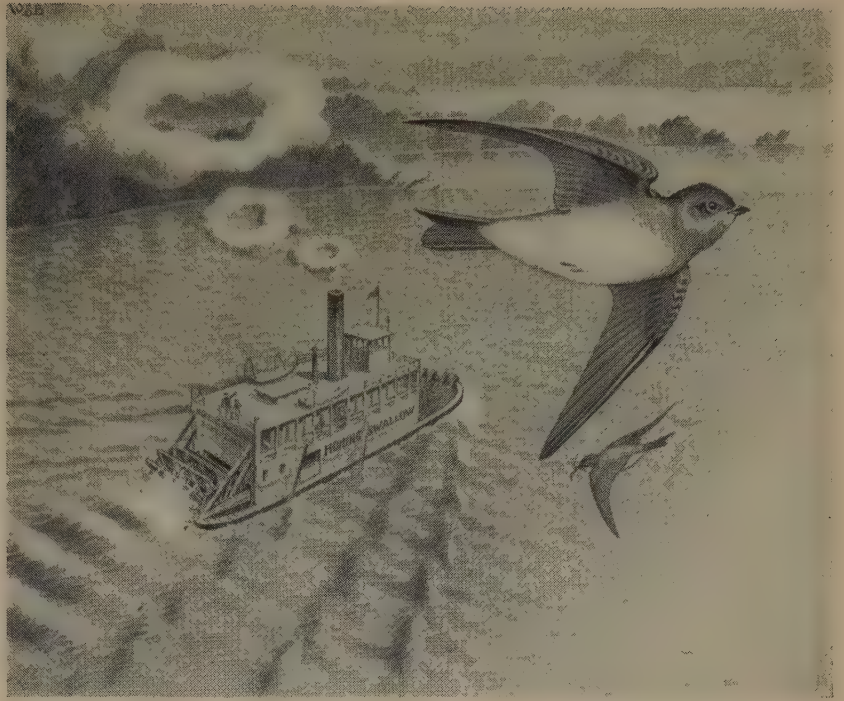
Nesting Novelties

By PAUL H. OEHSER

Illustrations by
Wilfrid S. Bronson



Rough-winged swallows built their nest beneath the deck of a transfer steamboat plying the Tennessee River in Alabama. The birds followed the boat on its trips, feeding their young en route.



IN ITS issue of July 5, 1943, the magazine *Life* printed a letter from Cy La Tour, of Pasadena, Calif., describing the unusual nesting site of a California quail—unusual, of course, only from the human viewpoint. The bird had chosen the protection of a fallen palm frond on the lawn of the Pasadena chapter, American Red Cross Production Center, where hundreds of workers pass every day. “By chance the photographer’s foot happened to dislodge the frond, thus revealing a nesting California valley quail which had tunneled under the fallen frond to build her nest. Disturbed by the photographer’s investigation of her hide-out, the quail temporarily abandoned her nest. Uncovered was a full setting of 15 eggs.”

This item, which was accompanied by a photograph of the nest, reminded me of other nidification novelties that I had read about, particularly in Bent’s *Life Histories of North American Birds*, six volumes of which (those published since 1931) I have had the pleasure of editing and seeing through the press for the United States National Museum.

To watch a bird build its nest, even in a normal situation—in the vine on your porch or in the tree outside your window—is indeed a fascinating experience; but to come upon a nest in a place or under circumstances the like of which no other human being has witnessed—this, for naturalists at least, is something approaching a thrill. And it seems that bird-watchers, although they are always on the alert for the typical, humdrum activities of bird behavior—the episodes that make up a bird’s pattern of living and that can be relied upon as distinguishing characteristics—nevertheless are ever eager to record unusual or unique items that occur perhaps only once in a bird’s lifetime. They have, like Mr. La Tour,

found birds nesting in the “strangest places,” and a good many of these novelties have found their way into ornithological literature, some of them almost classics. I have exhumed a few of these, not because they prove anything, but merely for their intrinsic interest.

Joseph Mailliard, of California, found, for example, the nest of a Barlow’s chickadee in Golden Gate Park, San Francisco, located in the large mandibular foramen on the inside of the left mandible of a huge sulphur-bottom whale skeleton.

G. S. Agersborg, of South Dakota, records a nest of a red-headed woodpecker found in the angle formed by the shares of an upturned plow. This record dates from 1881.

A pair of flickers and a pair of house wrens once nested in holes in an old stump in a lion’s cage in the National Zoological Park in Washington, D. C. They were discovered by Ned Hollister, late director of the Park.

Fred H. Kennard once found a chimney swift’s nest just under the ridgepole of an old barn and against the side of one of the logs of which it was constructed. “It was within a foot of an enormous hornet’s nest.” This was in New York State.

Lee R. Dice found a nest of an Arkansas kingbird on a hay derrick near Wallula, Wash. “The bird,” he says, “remained on the nest even while the derrick was in use.”

A. C. Bent, of Taunton, Massachusetts, author of the famous *Life Histories*, himself reports this unusual nesting of the scissor-tailed flycatcher in Texas: “While I was waiting one day for my guide to appear at a farmhouse, I was amused to see one of these flycatchers attempting to build a nest on the wings of a windmill that was in active use. Each time the wind-

mill went into action the nest was destroyed; but the flycatchers were not dismayed, and started each time to rebuild it. This happened several times while I was watching."

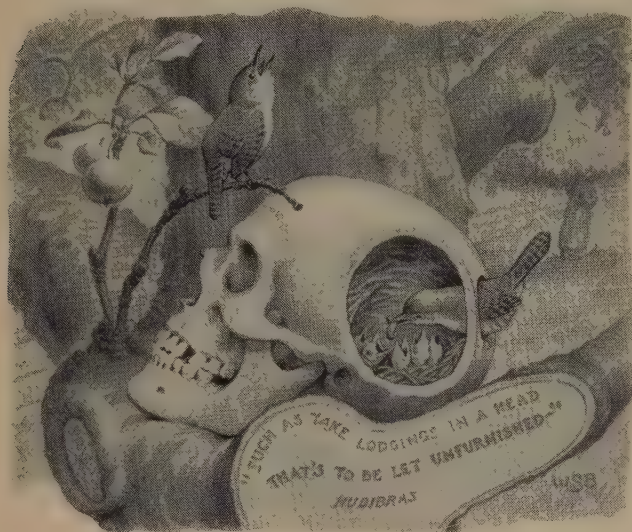
Arthur H. Howell reported this remarkable nesting site of the rough-winged swallow in Alabama—the buttress beneath the deck of a transfer steam-

sixty-two feet and built their nest on the front of this metal boiler."

Ivan R. Tomkins describes the nest of a barn owl found in one of the steel range lights on the Savannah River. "The nest was in a steel box about 2 feet square, with part of the west side open to the sun, under the light, and was liberally carpeted with pellets. The keeper of the light says the owl nested there for about 4 years." W. E. D. Scott reports a pair breeding on the hull of an abandoned dredge that "had belonged to the company engaged in draining and reclaiming land in the vicinity of Lake Okechobee."

Florence Merriam Bailey writes of a peculiar nesting site of the ash-throated flycatcher found by J. Stokley Ligon in New Mexico. It was in a "four-inch exhaust pipe six feet long standing at an angle of about thirty degrees, coming from the cylinder of an abandoned oil engine. The pipe was smeared inside with the black fuel oil softened by the heat and the parent bird which flew from the nest, that was about twelve inches down inside the pipe, was so black that Mr. Ligon had difficulty in recognizing it."

Wrens, it seems, will build their nests almost anywhere. Mrs. Bailey writes of a pair of house wrens that crept inside a human skull that Dr. A. K. Fisher was bleaching in an apple tree. There they raised their brood, "untroubled by ghosts. The doctor was



Wrens nested in a skull bleaching in an apple tree. The artist has cut open the skull and thought the quotation apropos to the incident. We are inclined to agree.

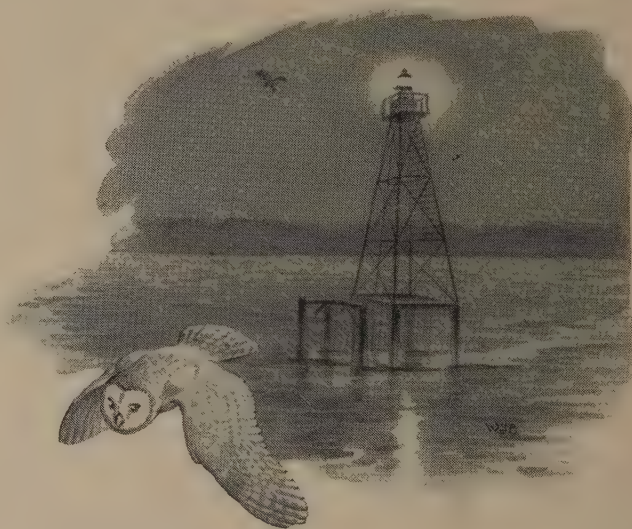
boat that made daily trips on the Tennessee River from Guntersville to Hobbs Island, Ala., a distance of 24 miles, "leaving at 10 a.m. and returning at 6 p.m. The birds, of course, followed the boat all the way to feed their young."

The British ornithologist William Yarrell, many years ago, told of the nest of a European swallow "built on the wings and body of a dead owl, hanging from a rafter in a barn."

Harry S. Swarth reported that a narrow-gauge train, carrying passengers and freight over a two-mile portage from Lake Tagish to Lake Atlin, British Columbia, furnished a home for a pair of barn swallows for several seasons. Similarly, Burton W. Gates observed a barn swallow's nest year after year under the guard rails of a steamer on Lake George, New York.

Phoebes have been seen nesting in many odd places. George M. Sutton writes of a phoebe's nest "on a strip of wallpaper that sagged from the ceiling." E. D. Nauman found one five feet down in a well, "which had been planked over except for a 12-inch opening, 10 feet above the water." Lester W. Smith writes of one "on a portable cider mill."

William L. Finley, of Portland, Oregon, tells of an engine house with a "metal smokestack sixty feet tall and thirty inches in diameter. The lower end of the flue broadens out and opens into the front of a boiler. A pair of Vaux's swifts dropped down the metal flue



A pair of barn owls nested in one of the steel range lights on the Savannah River. The site was a steel box about two feet square and the owls used the site about four years.

so impressed by their adaptability that he waived all claim to his skull, and the wrens' nest is now on exhibition in the National Museum." Henry Nehrling found the nests of Bewick's wrens in smokehouses, in stovepipes that lay on the ground, in the pocket of an overcoat hanging on a piazza, in tool boxes, and in bookcases in inhabited rooms. In her book *A-Birding on a Bronco*, Mrs. Bailey describes the nest of a Vigors's wren in a horse's unused nosebag hanging in

the ranchman's old wine shed at the Baileys' ranch in southern California. There is shown a pen-and-ink sketch of this nosebag site drawn by Louis Agassiz Fuertes.

Charles E. Northcutt, in *The Bluebird*, published by the Audubon Society of Missouri, has described a pair of wrens that became deservedly famous in Boone County, Missouri, for they built their nest, of all places, over the right rear axle of an automobile, between the frame and the body of the car. "The car," he says, "was driven back and forth to Columbia twice a day to deliver milk. On two occasions the car spent the day in neighboring towns. During this time the car was driven 1210 miles, but the plucky faithful little female had laid five eggs and hatched every one of them. All five of the baby wrens were cared for before and after each trip made by the car."

And so it goes. . . . These are only a few. At the start I said that these oddities of bird behavior do not prove anything, but perhaps really they do. They certainly show that the observer, be he amateur or professional, who has the knack of discovering and describing such curiosities, is the one who derives the most pleasure from Nature. As a final example, let me use William Brewster's story of the kingbird's nest (from his journal, dated July 14, 1892):

"During my last trip down [Concord] river I

noticed what I took to be a bunch of drift, clinging to the extreme end of a half-dead branch of a willow which extended out over the river, scarce two feet above the water. This morning, to my astonishment, it had developed into a neatly-finished nest on which a Kingbird was sitting on one fresh egg. Both nest and bird were absurdly conspicuous and I was not surprised when, passing the spot on my return, late in the afternoon, I found the nest empty and the bird gone. Yet what could have taken the egg? Certainly not a Squirrel, probably not a Jay, and there are no Grackles along the river now. I am inclined to suspect a Cuckoo was the thief. (I afterwards found the egg *in my canoe!* In some mysterious way I must have shaken it out of the nest.)"

William Brewster, we know, did not go out of his way to track down the purely bizarre in Nature, yet he was quick to recognize Nature's eccentricities, to see some humor and romance in natural phenomena, and to enjoy them for what they are worth. It was thus that Nature became for him a source of endless delight as well as of an enduring philosophy. For, after all, Nature does speak

"A various language; for his gayer hours
She has a voice of gladness, and a smile
And eloquence of beauty . . ."



You See What You See

By WILLARD HALLAM BONNER

There are several old chestnuts about seeing Nature. In one a poet and an engineer gaze at Niagara Falls. The poet writes a lyric about falling water or an ode to life, time, and eternal change. The engineer sees power. Another concerns the forest primeval and, let us say, Lake Champlain or Saratoga, the dilemma being which is esthetically more pleasing, a scene untouched by man or a scene marked by man's habitation, and richly and irrevocably associated with man's history. The first chestnut poses the eye of applied science against the eye of imagination; the second the romantic against the classicist.

Yet the greatest Nature poet in English suggests no such clearcut opposition but rather a merging of Nature and humanity in a strange new way. He derived still another pleasure.

Wordsworth's greatest pleasure came from *recollecting* a scene. As he meditated and looked into his memory he enjoyed an excitement *greater* than that which the scene originally furnished the physical eye. Everyone knows his poem on daffodils, which ends—

For oft, when on my couch I lie
In vacant or in pensive mood,
They flash upon that inward eye

Which is the bliss of solitude,
And then my heart with pleasure fills
And dances with the daffodils.

This was a working principle in Wordsworth's poetry, as he publicly declared. Brooding still more, however, this great poet found that these pleasing thoughts of Nature led him to thoughts of man, and he heard "the still sad music of humanity" as well as the murmuring waters and winds. Then finally he merged Nature, man, and God in one stupendous whole—

And I have felt
A presence that disturbs me with the joy
Of elevated thoughts; a sense sublime
Of something far more deeply interfused,
Whose dwelling is in the light of setting suns,
And the round ocean and the living air,
And the blue sky, and in the mind of man;
A motion and a spirit, that impels
All thinking things, all objects of all thought,
And rolls through all things.

He saw, felt, thought, and weighed Nature.



Cinderella Lily Now a Princess

By CARROLL ABBOTT

This is one of Mr. Russell's favorite creations, "Annis Victoria Russell," a giant yellow lily that may have thirty buds to a stem. This hybrid daylily came from other hybrids to produce a striking and beautiful plant. As many as five thousand crosses may be made in the task of producing a new sort. This takes time and patience, and there are many daylilies that have to be discarded or used to feed the horses in the process.

GLIMPING possibilities of hidden beauty and variety in the common, orange-colored daylily, H. M. Russell started on a quest nearly a quarter-century ago. Today he is the creator of more than two hundred commercial varieties of the daylily, or *Hemerocallis*. Other sorts grow on his twelve-acre farm at Spring, Texas, where there are more than half a million daylily plants.

Through skill and patience, Mr. Russell has produced a wonderful array of flowers that will flourish as a living tribute to his work. Also he has prospered, unlike many other famous plant breeders, although he seems to have little interest in the financial reward except as it permits him to carry on.

For a long time the daylily has grown in alleys, ditches, weed patches and back yards, largely ignored and a Cinderella plant. Its color pattern was not attractive or exciting, and few people saw in it any possibilities as a princess among plants.

Yet from this modest flower Mr. Russell has pro-

duced solid-colored lilies of mahogany, carmen red, chartreuse, peach, rose, pink, cream, chrome, wine, and purple. There are lilies in lovely wood shades of gentle rose-brown, with darker brown veins and yellow midribs that melt into a yellow throat. Many of the hybrids have beautifully contrasting veins, midribs and eye zones at the base of the petals. In the bicolors, there are hybrids with such marked contrasts as rose and lemon, violet-reds and yellow, raspberry and lemon, purple and yellow. In size the blooms range from that of a jonquil to the dimensions of a salad plate.

H. M. Russell was one of the first five men to pioneer the hybridization of daylilies. While he was doing general nursery work in Alabama, Georgia, and South Carolina, he was also crossing daylilies, and his first hybrids were sold for planting on large estates. Today he is believed to be the only man to make his living solely by selling daylilies.

Mr. Russell was born in Wheatland, Indian Terri-

tory, in 1901. When he was four months old, his father died and left him with nine other brothers and sisters. His father was a plant breeder in a modest way, for it is on record in Tallapoosa County, Alabama, that he produced forty bales of cotton on fourteen acres of unirrigated land from a variety he originated himself.

Before Mr. Russell finished the sixth grade, he went to work, and for twenty years engaged in general nursery work. It was not long before he realized the latent possibilities of the daylily and began his hybridizing in a small way. He went from Alabama to South Carolina, virtually with a lily on his knee.

While living in Sumter County, South Carolina, Mr. Russell learned that a grower in Virginia had a rare lily. When he visited the garden, a closed bud was given to him. With the bud he raced five hundred miles, driving all night, so that he would be at home with his lilies when the bud opened. He made it, and used the flower the next day to pollinate a number of lilies. This experiment led to the development of his midget varieties.

In telling of his work in the breeding of varieties that remain open at night, Mr. Russell says, "I found a little old lily that didn't close at night. That was my beginning. This silly little thing was just like a Chinese laundry. I'd go there at midnight and it would be open. When I returned at noon the next day, I'd find it closed." This "silly little thing" he regards as among the greatest developments in horticulture in recent years.

The early days were hard going, and more than once Mr. Russell was urged to sell the stock of his finer hybrids to the larger nurseries for distribution.

He steadfastly refused. The vision that saw undeveloped colors and hidden sizes also saw the day when he would be able to supply America with the finest in daylilies.

Six years ago the hybridizer moved to Texas to take advantage of the longer growing season. He abandoned all other work and went in exclusively for the breeding and growing of daylilies. Spending several years in collecting species, as well as the finer hybrids, Mr. Russell traveled as much as 19,000 miles on a single trip in completing his collection.

In 1941 he used twenty-seven thousand hybrids of his lilies on four landscape projects. Eleven thousand were used to add to the beauty of the Charles Urshel estate in Oklahoma City. The past few years have been spent in breeding for giant bi-colors and early-blooming varieties in darker colors.

Formerly the only early-blooming *Hemerocallis* was a yellow dwarf named Flava. Using this early bloomer as a parent plant, Mr. Russell made 5000 crosses. Now he has reds and purples in the early-blooming class.

His next catalog is scheduled to come out in blazing color. This spring visitors to his fields will have an opportunity to see a tremendous mass of daylily blooms, as each plant produces a multitude of blossoms.

Mr. Russell's originations have been given many romantic names such as "Painted Lady," "Old Vintage" and "Trail Blazer." Some have colorful histories. Once when Mr. Russell was vividly painting a glowing word picture of one of his unnamed hybrids, a friend asked, "Can I quote you on that?" "Certainly," replied Mr. Russell, and dubbed the new

H. M. Russell and an admirer of daylilies inspect an array of some of the new hybrid giants and bi-colors that he has produced. Some of the blooms in this collection are as much as nine inches across.



hybrid "Quote Me." Thus are flowers often named.

With so many thousands of hybrids, naturally all will not win the approval of the horticulturist. These undesirables therefore must be eliminated. One way was to dig a large pit and bury them, but this took time and money, so he now merely fences in the field of useless hybrids and turns the horses, pigs, and geese in to eat. It is a neat, clean, and economical solution.

"With so many hybrids it is difficult to pick my favorites," states Mr. Russell. However, he gave in

and picked as his color favorites, "Tejas," a glowing red, and "On Tour" and "Mrs. B. F. Bonner" in the pale lemon class, "Purple Waters," a deep rich purple. "Annis Victoria Russell," a giant with as many as thirty buds to a stem, was his favorite yellow. "Queen of Gonzales," which has flowers remaining open two days and a night, is his best chrome.

Recently Mr. Russell attained a high point in his useful career. He was proclaimed by the daily newspapers to be an industrial asset to his city of adoption, industrial Houston, twenty-three miles away!



Fly High

By MORRIS SILVERMAN

In the warm dust, on the quiet prairie
I saw a skylark lying cold in death;
No bruise or hurt, or feather disarranged
Had marked its agony of final breath.

How clean, how shining in the sunlight—
The bright wings furred, the limp head touching earth—
It lay! How still the perfect body
That moments since had laughed in darting mirth!

My singing and my errant footsteps stopped,
(Too much like breath, too quick to stop or start!)
And looking up, I saw the gleaming wires
Man-strung across the prairies, and my heart.

Still looking up (and now my eyes were closed),
I saw all living journeys, swift or slow—
A bird's flight or a man's—the wires are there—
And always, always, one must fly too low!



Preserving Baneberries

By EDWIN F. STEFFEK

RED and white baneberries are two plants that need not suffer extinction, for they are easily propagated. Give them a rich, slightly moist, well-drained woodsy soil, with half or almost whole shade, and they will be perfectly happy. They are not fussy about soil acidity, and once established are among the most permanent wild flowers.

In bloom, the two species are much alike, both producing, above their attractive compound leaves, small clusters of little white flowers somewhat like the false Solomon's seal. The leaves stay through the season, providing a handsome ground cover.

To tell the white baneberry, *Actaea alba*, from the red, *A. rubra*, remember the first bears waxy white fruits with a black-purple eye at the outer end and are mounted on short, thick stems. Flowers of the red baneberry, on the other



hand, are red and borne on slender stems.

The plants, which grow from a permanent clump of stout roots and live for years without creeping, may be divided in early spring. They can also be grown readily from seed planted one-half inch deep in flats or in the open ground. The whole berries may be planted, squashed somewhat, or cleaned seed may be sown, but be sure to plant it just as soon as it is ripe.

Handled in this way, the seedlings should appear the following spring. Otherwise, the seeds may lay dormant for a year before germinating. Transplant the seedlings so that they stand three inches apart each way. Blossoming should begin the third year and the plants

should continue to increase in size for several years more. Baneberries are at home from Nova Scotia to Minnesota, and south to Georgia and Missouri.

"Violets blue," the rhyme declares, but those who seek out wild flowers will find that—

One of Them Is Green

By LOUISA R. GLEASON

OUR forests are forever springing surprises on the ordinary dirt gardener. Who but a scientific botanist, in these days, would take a green violet as a matter of course? A *green* violet is a statement to make the dirt gardener prick up his ears, and shake his head with an illy-concealed skepticism.

There was a time when even the scientific botanists were brow-wrinkled and uncertain over it. They put green violet into the Figwort Family along with the calceolarias; once it belonged to Cybele, Goddess of Nature; and again it appeared among the Nodding Violet group. Finally, it seems to have convinced the systematists that it possessed a characteristic all its

own and was worthy of a distinctive name and place in botanical lore.

One Nicolaus Joseph Jacquin classified it as *Hybanthus*, a hump-backed flower, and a hump-backed member of the Violet Family it remains to this day, with the full name *Hybanthus concolor*.

The plant is not widely distributed. Gray's Manual, Seventh Edition, reports it "New York to Michigan, Kansas and southward." Michigan State College is fortunate in having a patch of green violets growing in College Woods. The soil is rich and moist, with plenty of leaf mold. Maples tower above the patch and shade it with an interlacing canopy of tree tops.

The plants are not conspicuous. They form an unpretentious ground cover growing about twenty inches high and giving a first impression of a growth of nettles, rank enough to be avoided. In early June the small blossoms appear in the axils of the leaves—grotesque little things about half an inch long, mostly pistil, surrounded by pale-greenish, stunted, twisted petals. From the queer flowers one's attention goes to the very densely-haired stem. The long leaves are distributed along the entire stem. Each leaf diminishes gracefully to a point at the outer end and contracts more directly at the stem end into its petiole. The fruiting time escaped this dirt gardener, but it is briefly reported that the fruit is a "pod."

Hybanthus concolor, the green violet. The flower, shown in the inset, is seen on the plant growing from the axils of the leaves.





To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then, below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south. Time given is Standard Time; add one hour for War Time.

The Stars as Suns

By ISABEL M. LEWIS

ON A CLEAR dark night one looks skyward and feels he is gazing upon a universe of countless stars. This is true. Yet it is a fact that by actual count, with unaided vision, three thousand stars is the most that one may expect to see at any one time. But the invisible hosts are there, and the powerful telescope as it sweeps over the heavens will bring them forth triumphantly, brilliant glittering points of light, millions upon millions of them. We see them individually or as members of great globular clusters; in far distant island universes; in star clouds of the Galaxy; in the Magellanic Clouds; among the Pleiades and Hyades, and entangled in wisps of nebula in the great constellation of Orion.

Wherever they are found all stars have one characteristic in common. They are suns, sources of light and heat, glowing masses of many gases that are

mostly uncombined and free. Only a few chemical compounds are found in the atmospheres of the stars. They may and do differ very greatly among themselves, however, in size, mass, color and temperature.

Our own sun, as the nearest star, gives us much information about stars in general. There are many stars in space that resemble our own sun in type, but there are countless other stars that differ from it greatly. The sun is an average star in many ways—in size, temperature and general behavior. So far as is known it has never gone through the experience of being a nova. It is only slightly variable in light. It has no companion star, although it has a sizable family. It turns slowly on its axis and journeys onward through space with its brood of planets and their satellites. On the whole our sun is a well-behaved, well-ordered star, pouring forth light and heat

lavishly for the support and nourishment of its attendant worlds. It is a normal star and unlike many other stars it is never erratic or unpredictable in its behavior.

Stars differ tremendously in size. Consider the white dwarf that is a companion of Sirius. Calculations of its diameter have shown it to be about the size of the planet Uranus. Then at the other extreme there is the red giant Antares, which has a diameter of more than 400,000,000 miles and would, if placed at the center of our solar system, extend far beyond the orbit of Mars.

The companion of Sirius belongs to a group of stars, known as white dwarfs, that are possessed of some most extraordinary properties. The mass of this star is nearly as great as that of our own sun, but it is compressed into a globe of planetary size—about 30,000 miles in diameter. A handful of such star-stuff would weigh several tons. The star is bluer and hotter than the sun. The great density of such stars is believed to arise from the fact that the atoms within their interiors are stripped of their electrons, so that only the nuclei remain, and they are closely packed together, so that an abnormal condition exists within the star. The stars that have been found to be of this type have increased considerably in numbers in recent years as astronomers have reached farther into space.

The red giant stars are a great contrast to the white dwarf stars in size and in density. They are comparatively cool stars of enormous size, but the quantity of matter that they contain is so small in comparison to their size that their density amounts to less than one-thousandth of that of air at sea-level.

The super-giant stars of great luminosity are far outnumbered by stars of low luminosity. For every super-giant there exists, it has been estimated, 200,000 stars of about the same intrinsic brightness as our own sun. Even the nearest of the red dwarf stars can not be seen without the aid of the telescope. As seen with the naked eye, the giant stars are visible to a far greater depth in space than the less luminous stars and appear relatively more numerous than they actually are.

There are twelve known stars that are less than $10\frac{1}{2}$ light years distant from the earth. Four of these stars, namely Alpha Centauri, Sirius, Procyon and Tau Ceti, are visible to the unaided eye. The first three are brighter than first magnitude; the third is a fourth magnitude star. The remaining eight stars are faint, telescopic, dwarf stars. The nearest star to

the solar system is about a tenth of a light-year nearer than Alpha Centauri and is known very appropriately as "Proxima" Centauri. It is a tenth magnitude star about two degrees distant from its brilliant neighbor.

All stars are in motion through space and many of them are known to be turning on their axes. They probably all do so. Algol, the eclipsing variable star in Perseus, is in rapid rotation, and some of the bluish stars are rotating in their equatorial regions with a velocity of 150 miles a second, which is about 120 times as fast as our own sun rotates.

Many stars are members of moving clusters, traveling along parallel lines and at the same speed through space. All of the stars in the Big Dipper with the exception of the two end stars, the star Sirius, and several other comparatively near, bright stars, are members of this disk-shaped cluster, which is about 150 light years in diameter. The sun is within this cluster but is not a member of it. So far as is known our sun is not a member of any such moving group of stars. Other such "open clusters," as they are called, to distinguish them from the compact globular star clusters, are the stars of the Pleiades and of the Hyades. The Scorpio group contains many bright stars in this constellation and in the Southern Cross; and the

stars in Orion, with the exception of Betelgeuse, belong to another great cluster that is moving away from us.

Counts of stars in different regions of the sky have been made, and have shown that there is a thinning out in the number of fainter stars, as distance from the earth increases. The total number of stars in the entire heavens bright enough to be seen with the average eye without a telescope is about six thousand. This number increases enormously when even a small telescope is used. The total number of stars brighter than twentieth magnitude, which is about the limit of the 100-inch telescope, is about one billion. The combined light of all these stars would be about equal to the light of 1100 first magnitude stars. The stars visible without a telescope furnish about one-fifth of the total light. There are billions of stars fainter than the twentieth magnitude, but they contribute only two of three per cent of total star light.

The light of the sky on a clear moonless night consists of light from the auroras, the zodiacal light, and star-light, and only about one-sixth of all this light, according to reliable estimates made by the astronomer van Rhijn, comes (Continued on page 274)

Star Signs of Spring

By CLARENCE ALLEN ATWELL

The stars of spring are here at last.
They tell us that the winter's past.
Orion's sinking in the west,
The cold Dog-Star has lost its zest.
While in the east bright Spica glows
And Virgo scatters wheat that grows.
Arcturus there is rising too,
With golden light it shines anew
And marks the figure of a god,
Who ancients said first plowed the sod.
The Beehive cluster high o'er head
Reminds us flowers thought as dead
Will bloom again, their honey bring.
We hail these welcome signs of spring.

The Loftiest Leaper

By EDITH M. LAING

So challenging is the leaping salmon shown on a Newfoundland stamp that I sought to ferret out information not generally known about this zippy member of the fish tribe. However, much correspondence, reading and consultation finally convinced me that scarcely any other creature had had its private life so thoroughly searched.

Anyone reading the incredibly intimate and absorbing story, *Salar the Salmon*, cannot help feeling that it surely must have been written by Salar himself, instead of—according to the publishers—by Henry Williamson, the English naturalist.

The Atlantic salmon, *Salmo salar*, is distinct from the Pacific species, and attempts to introduce it to the Pacific Coast have so far proved unsuccessful. On the European side of the Atlantic it occurs in Norway and Britain, and on the American side it is—or was—found from Labrador to the New England States. These salmon are thought to have originated in the Arctic region, and to have been forced southward by the ice cap. Much to the delight of anglers, the streams of South Africa and New Zealand have been artificially stocked with success.

Organized marking of salmon has determined that individuals return from the sea to the stream in which they were hatched. One theory for this is that the majority of the fish remain near enough to shore so that they naturally follow back along the current of their home stream. Nevertheless, some are decidedly more adventurous, for one marked salmon was taken 620 miles from shore.

During their first two years in fresh water, young salmon are known as parr. Gradually they make their way to tidewater, where their silvery skin takes on a design of spots and bars. They are then called smolts. Once out to sea they grow rapidly, and often remain there five years before returning to spawn. Age is determined by ridges on the scales. Unlike the Pacific

salmon, the Atlantic salmon do not die after spawning, but make the spawning trip several times. Perhaps this is because Atlantic rivers are not so long as those on the Pacific coast, and so the salmon do not become exhausted. At sea they feed on crustaceans, and small fish, mostly herrings.

Atlantic salmon is not nearly so numerous as the Pacific species, and so comparatively little is canned.

Before the war, most of those commercially caught were frozen for shipment to Britain.

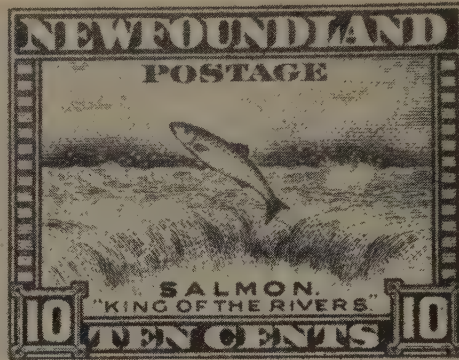
The spawning season was eagerly anticipated by primitive Indians, salmon eggs being a delicacy and an important item of diet. Between the coast and inland Indians there existed a profitable exchange of fish for game and other supplies. Much fish was dried, ground fine, and stored in skins or baskets for journeys and against the winter.

Our fishing gear of today is really no more ingenious than was that of the Indian, for he made the utmost use of the limited materials at hand. On lines of twisted hair, sinews, bark, vines, and kelp, he used cunningly-contrived hooks of wood, bone, shell, or copper, baiting them with minnows and cut fish, or even artificial bait and lures.

With mats of brush or woven saplings the Indian constructed fish traps. The spear, club, or bow and arrow all played their part as weapons.

The different varieties of landlocked salmon are considered to have evolved from Atlantic salmon long ago trapped in inland waters by geologic upheavals. Newfoundland streams, notably the Humber, are famous among salmon fishermen.

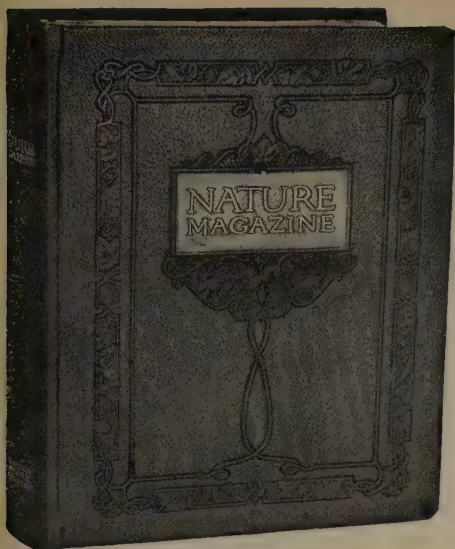
A glowing tribute to the lake salmon has been penned by Henry Van Dyke: "As Launcelot among the knights, so art thou among the fish . . . champion of all the water folk . . . the cleanest feeder, the merriest liver, the loftiest leaper, the bravest warrior of all creatures that swim."



Maxim

By PAUL CHURCHER

No lover of birds is ever given
One single ornithological level
For living. . . . Not while larks skim heaven.
And every blue jay's full of the devil.



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Time Flies

Seventeen years ago, in our issue for May, 1927, we carried an excellent article by A. B. Champlain and H. B. Kirk on the seventeen-year "locust," or periodical cicada. The article was a timely one since that was the year in which these remarkable insects, members of Brood I, were to make their appearance. They appeared on schedule and started the cycle that was to culminate in 1944. That seemed a long way off at the time the article appeared, but here we are.

Not that it will mean much to the cicadas, but they were eggs, and then nymphs, in the days of two chickens in every pot and two cars in every garage. Looking much like fleas, these nymphs hid in cracks in the soil after hatching from the eggs, dug themselves a foot or eighteen inches into the ground and set out on a seventeen-year period of drawing sustenance from small roots, changing their clothes every two or three years and growing until they came to the last pupal stage. Now they emerge to find that man has gone through a world economic depression and is now fighting a world war.

This spring, in May, the members of Brood I (there are about 30 identified broods) will emerge in uncounted thousands in parts of Pennsylvania, Maryland, Virginia, West Virginia, the Carolinas, Kentucky, Indiana, Illinois and Kansas. Tan-colored creatures about an inch long will crawl out of the ground and swarm up tree trunks, fence posts or any object in their paths. The skin of this pupa will split up the back and out will come a red-eyed, six-legged, four-winged cicada about one and one-half inches long. Its shiny, transparent wings will have orange-colored veins, blending into brown as they grow smaller. Near the tip of each front wing will be a brown marking resembling the letter "W," signifying to the superstitious "war, want and woe." The circumstances under which the cicadas now appear certainly lend support to that old wives tale. Lacking jaws, the cicadas will suck juices from plants with a slender, reddish beak. The males will make a racket with their elaborate drum-like apparatus. The silent females will go about their business, finally puncturing twigs and laying their eggs in the slits. In six weeks or so the eggs will hatch into the nymphs that will fall to the ground to start the cycle all over again and return to sunshine once more in 1961 as adults. Let us hope they return to a happier world.

Big White Oak

Another candidate for big oak honors is a white oak twenty-seven feet, six inches in circumference, at five feet from the ground, reported by Mrs. Charles F. Hunt of Hightstown, New Jersey. It grows on one of her father's farms near that community.

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The School Page

By E. LAURENCE PALMER

Professor of Rural Education, Cornell University,
and Director of Nature Education, The American
Nature Association

TEACHING NATURE BY RADIO

THE WEEK in which this appears will mark the beginning of the sixteenth year in which the writer has carried on a regular Nature program by radio. Except for the first year, it has appeared under the caption of "This Week in Nature." This one and a half decades is probably a longer period than that enjoyed by most of the current soap operas and spine tinglers, although merit and longevity are not necessarily correlated. So, before a new year of effort and enjoyment is begun, it may be appropriate to take stock of what has been accomplished and what can be accomplished by the radio technique.

"This Week in Nature" has had no commercial sponsor and so has made no money for its producer. Many of the current higher bracket big-shots of today were, when the program started, crooning from their cradles. Not once has our program had a nationwide hook-up. And yet we know that a steadily increasing number of schools are using it in their regular activities.

The program has run the gamut of offerings. At first, it consisted of a set speech typed in duplicate, delivered to the studio days in advance, and given by a nervous, perspiring speaker, guided by signs of worried engineers in the control room. Then, it graduated into a dialogue of written stilted speeches, usually steered by obviously uninspired questions raised by one speaker. For a time, it centered on civic aspects of Nature problems, and went to bat with local sportsmen about baiting ducks and shooting hawks to such an extent that they tried to get the program blocked from the air. One particular season was devoted—to some effect—to opposing such fox hunts as the atrocious and despicable one so ably reported from Holmes County, Ohio, in *LIFE* of March 13, 1944. The hunters did not succeed in stopping the program but merely strengthened it by their opposition.

Ideal Sought

However, it did not seem that such programs were rendering ideal school service. Therefore, a more typical school field was explored. At the time, a national program and a powerful state station were giving regular school programs in which the children spoke or read from prepared scripts in high-pitched, unnatural voices. To the writer, this technique seemed ridiculous. So, one day he hopped into his car, drove out to a rural school he had never visited before, asked the teacher to loan him four youngsters whom he had never seen, and took them to the broadcasting booth for an untutored lesson. The results were surprisingly satisfactory. Evidence of increased interest began to accumulate.

In these air lessons, the "teacher" had the opportunity to make an adequate preparation, while the children had no such opportunity. This did not seem quite fair, and certainly was not in keeping with the recommendations educators were making that lessons should spring from the interests of the children themselves.

To meet this new situation, the children who came to the studio were asked to empty their pockets of subject-matter on the table under the microphone and after the program had gone on the air. A lesson was developed from the materials at hand.

The surprising thing was that in almost no time the children lost their affected diction and were learning, and helping others learn, about something in Nature that had appealed to their collecting instinct. Not once since this feature was introduced, some years ago, has the instructor known what the lesson was to be about until the program started. Once, when the instructor had expected the children to bring materials, they arrived late and with no materials. A lesson on heat insulation was immediately developed, based on the fact that one of the girls had a coat with fur on the outside, while one of the boys had a coat with a fur lining. From it, developed an understanding of how to use mittens and socks to keep hands and feet warm in severe weather.

While this procedure was popular, it had its critics—those who wanted to have the program follow a consistent pattern through the year. A compromise has been effected to take care of this situation. Now, once a month, there is a "pupil-suggested program," with the remaining programs being designed to satisfy the interests of varied groups. Once a month there is a lesson on measuring something, such as sound, slope, speed, light, heat, roughness and so on, all designed to help refine the reports children make on what goes on about them. One broadcast a month deals definitely with the current seasonal changes. The remaining lessons are chosen to help enrich the standard lessons in science given in the schools.

Programs Stimulating

The writer likes to think that the programs sound natural and spontaneous. Certainly, they have been stimulating. One little imp, whose teacher was the acme of refinement, exclaimed, "My God, pop!", when the program was on the air. Pop bottles had been introduced to help in the study of carbonated water. Another demure maiden was asked on Thanksgiving Day what she expected to have for dinner, since the instructor was prepared to give a lesson on the anatomy of a bird. Most of his aplomb vanished when the youngster announced, with an affected French accent, that they usually began their Thanksgiving dinner with some "entrails." Another precocious youngster emptied a salt sack of skulls on the table when the program was under way. When asked if he knew whether they were the skulls of birds or of mammals, he said that they were of mammals since they had a double "occitipal condyle." Pet peepers have peeped; crayfish have pinched children's fingers with normal resultant reactions; little girls have handled snakes for the first time, producing squeals that out-Sinatred Sinatra. Generally we have had a good time.

One thing has been studiously avoided in this program. No opportunity has been provided for the kind of youngster who shows off so blatantly on some juvenile programs. If any attention is directed to any particular child, it has been to the one who was naturally shy and not prompt in expressing himself. Not infrequently this child has made the most pertinent contribution to the discussion.

Teachers who have listened regularly to the programs seem to appreciate those in which the children have supplied the material after we are on the air. Such programs must be less finished than prepared ones but they suggest how teachers can meet similar situations when children come to them with unannounced problems. The programs have always been seasonal and appropriate to the area reached by the stations using the records. Last June, the program followed immediately a government release in New York in which some city people were reported to have gone out into the fields of the state and helped the farmers solve the labor problem by picking tomatoes through the long June day. It seemed so doubtful that the script writer of that release had ever seen a growing tomato plant that "This Week in Nature" took the opportunity to present a more rational picture. In fact, the professional radio script writers have offered a great abundance of material that this program has corrected.

There are those professional educators who will claim that no valid educational contribution has been made unless one

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can measure the contribution and express its value by the application of a mathematical formula. They may be right. They may also be wrong, and whether they are right or wrong it is certain that the number of schools using the program has increased satisfactorily through the years. We know of 168 rural schools receiving the program regularly now. This cooperation has been effected without any orders from the higher-up administrators. The program has uncovered no infant prodigies, thank goodness. It has not stimulated the sale of any brand of cigarettes, but it has interpreted through normal children the things that interest them when and where they are. Since it is rare for any child to appear more than once or twice a year except during the summer months, a rather significant number of youngsters have had the opportunity of appearing on the program. In addition, it has given at least one college professor of education the opportunity of teaching a group of elementary children a lesson a week through the years under stimulating circumstances. This has had no little effect on what he writes for others. If one can believe what people write and say, the program must be making a unique place for itself. If one considers the amount of time in which there has been contact between instructor and radio listener, the writer doubts if he has had any more stimulating or effective opportunity to demonstrate his philosophy than has been afforded by this radio program. It has had its headaches and growing pains. But now it is sufficiently matured to be real fun. It is hoped that senility is a long way off.

Coyote or Dog?

We are afraid that the frontispiece that accompanied the coyote article in the March issue is a picture of a police dog, or, at best, a coyote-dog cross. It was in our files listed as coyote and—apparently with a little wishful thinking since it was a nice picture and the right size and shape—we accepted it as such. Two readers think they detect signs of a collar on the animal. Close examination of the original does not reveal this to be a fact, however. Nevertheless, the muzzle of the animal does seem too heavy for a pure coyote, and the ears are not those of a true coyote, either. As much as we would like to think that it was what we said it was in the caption, we are fearful that we slipped up.

Nature Binder

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TO THE EDITOR

Poison Practices

Editor, Nature Magazine.

I have just read your splendid article entitled "Coyote Cunning." You perhaps did not stress enough that the coyote and his associated family, the fox, are Nature's children and do a great deal of good along with the devilment they sometimes do. They are especially valuable in prairie country for the gophers they destroy, field rats and mice, many forms of snakes, and countless forms of insects. Also, as you say, they will eat fruit for dessert—all kinds that grow wild.

What I especially wish you would some time write up is the point you mentioned about the Federal Government's project of putting out poison for these animals. I have just returned from a trip to Texas, and really the fellows who get the coyotes are the hunters who get them with hounds. One chap with whom I hunted averages one a day the year round. This poison business usually poisons everything except the coyote. Naturally we taxpayers protest against wanton throwing away of our money trying to poison these animals. The poison is usually put around water holes with salty meat and strychnine. At one water hole we found six skunks, three raccoons, two turkey gobblers and three wolf hounds, but not a trace of a coyote. On that particular hunt, the hounds had caught a wolf not far away after running him forty miles, and the entire pack of fifteen hounds would have been poisoned, as were the three, had we not arrived on the spur of the moment to catch them.

One rancher, who sanctions poisoning, says he counts on losing at least three cattle every time the poison is put out, but does not think that is too high a price to pay to get rid of a coyote or two.

The greatest racket in the whole State of Texas is run by the poisoner and the trapper. He is on a salary of about \$160 a month and expenses, and of course he must make a showing by a report of a certain number of scalps to his department. How does he get them? I took it upon myself to investigate this, and here is the scheme: Many of the small-time farmers and tenants set steel traps around to protect their chickens (after all, about all the harm the coyote does in the cattle country is to catch chickens). The trappers spend their time going around collecting the scalps, paying the natives for coyotes they have killed in self defense.

Most of the bigger ranchers object to poison in any form, fortunately, or the damage would be much greater than it is. The point is, why pay out this money to the poisoner when the harm they do far exceeds any possible good? Furthermore,

this should not be a Federal project. It is a State or even a County project. Louisville, Ky. Misch Casper, M.D.

We Like It, Too

Editor, Nature Magazine.

It is *Nature on Parade* for which I wish to especially express my appreciation. Your ads about it in *Nature Magazine* are entirely too conservative. It is the most beautiful and one of the most interesting Nature books that I have ever seen. In fact, I think it is the aristocrat of Nature books.

Springfield, Mo.

Edith Johnson

Many Thanks

Editor, Nature Magazine.

... *Nature Magazine* is maintaining an excellent quality in a field that so often abounds with the mediocre. I know of smug, discriminating persons who are actually warming up over the things you are doing. Keep it up.

Los Angeles, Cal.

Hatch Graham

Binder Boost

Editor, Nature Magazine.

I find your *Nature Magazine* binder very nice indeed. This is truly a suitable way to keep these Nature Magazines a lifetime.

Mrs. L. A. Wasserman

Springfield Gardens, N. Y.

Grosbeak Virtuoso

Editor, Nature Magazine.

We have many blackheaded grosbeaks here every summer, but for the past five years we have been positively entranced by the unusual song of one, in particular. He sings like a Hartz Mountain canary. He begins his song as the other grosbeaks do, but elaborates upon it as he sings with whistles, trills and warbles, ending in three long drawn-out whistles that start low and end in a higher key. He is so definitely outstanding as a soloist that each year we have eagerly awaited his return. . . . We began to fear that none of his offspring would be males, but last year we had our reward. He returned with two lovely males both equally brilliant songsters. Although his plumage was dull and faded, his song lacked none of its beauty and we are looking forward to the return of all three.

Forsyth, Montana.

Ethel Haywood

Animal Pictures

Our Dumb Animals, official publication of the Massachusetts S.P.C.A., announces its annual photographic contest to obtain story-telling pictures of wild or domestic birds or mammals. The contest closes June 30, 1944. For details and rules send to *Our Dumb Animals*, 180 Longwood Avenue, Boston 15, Massachusetts.

THE STARS AS SUNS

(Continued from page 269)

from the stars. No account has been taken of possible absorption of light in space, which, it is believed, may be considerable along the Milky Way's path.

Estimates that have been made of the number of stars are all exclusive of the stars that exist in great globular clusters and island universes such as the Magellanic Clouds and the Great Andromeda Nebula. Billions of additional stars must exist in all these far distant systems.

The planet Mercury is in inferior conjunction with the sun on May 2, when it passes to the morning sky. On May 29 it will be at its greatest distance west of the sun, but will not be seen to advantage, as it will be only ten degrees above the horizon at sunrise. It will then be as bright as a first magnitude star rising more than an hour before the sun. Venus is now low in the morning sky, rising only shortly before the sun. It is not well-placed for observation and is drawing closer to the sun.

Mars is now in the evening sky, passing from Gemini into Cancer during the month. It is between first and second magnitude in brightness and is receding from the earth, decreasing in brightness.

Jupiter is in Leo northwest of Regulus and will be in quadrature with the sun on May 8, when it will be due south at sunset. It is the most brilliant object in the evening sky and is easily recognized.

Saturn is approaching the sun rapidly, and sets about three hours after it. It is now as brilliant as Betelgeuse or Capella, which are not far from it, but is a pale yellow in color. Its rings are now nearly at their widest opening and are beautiful as seen even with a small telescope.

Mouse Plague

J. W. George of Petaluma, California, writing in the *Argus-Courier* of that community, corroborates the effects of a plague of mice as described by Vernon Bailey in the February *Nature Magazine*. Some years ago Mr. George planted 9000 eucalyptus trees. The third year after the planting there was a heavy crop of grass in the young grove, and he noticed hawks and owls hovering about the area. In the fall he found that three-fourths of the young trees had been girdled. Rabbits were first suspected, but investigation showed runways of field mice, that seemed to have descended in great numbers from nowhere. The trees were about the size of a fork handle and stood an average of twelve feet in height. The girdled ones were cut down and a replanting made, the mice having set the plantation back three years and doubled its cost. Mr. George is ready to agree that one pair of field mice, under ideal conditions, can produce a million progeny in a year.

Soldier Poet

Down in Guadalcanal and other hot spots in the South Pacific, Sergeant Chris Haldeman, U.S.M.C., found time from the serious business of keeping alive, and reducing the population of Japan, to think about poetic form. Back in this country, Sergeant Haldeman sends us a poem—in fact, two poems suited to spring publication. He feels that in handling of poetic thought they merit quick and early publication. The main body of the magazine having progressed so far physically that the poems could not be tucked in, we promised our Marine-poet to try to get them in elsewhere. Here they are:

Spring

The melting snow starts
to the tide
with early morning thaw.
The frosty ground gives up
its hold
to Spring's rebellious call.

The Robin's note
may soon be stilled
by unexpected winter's chill.
But—
Spring will come
and frosty snow will thaw.

Wild Geese

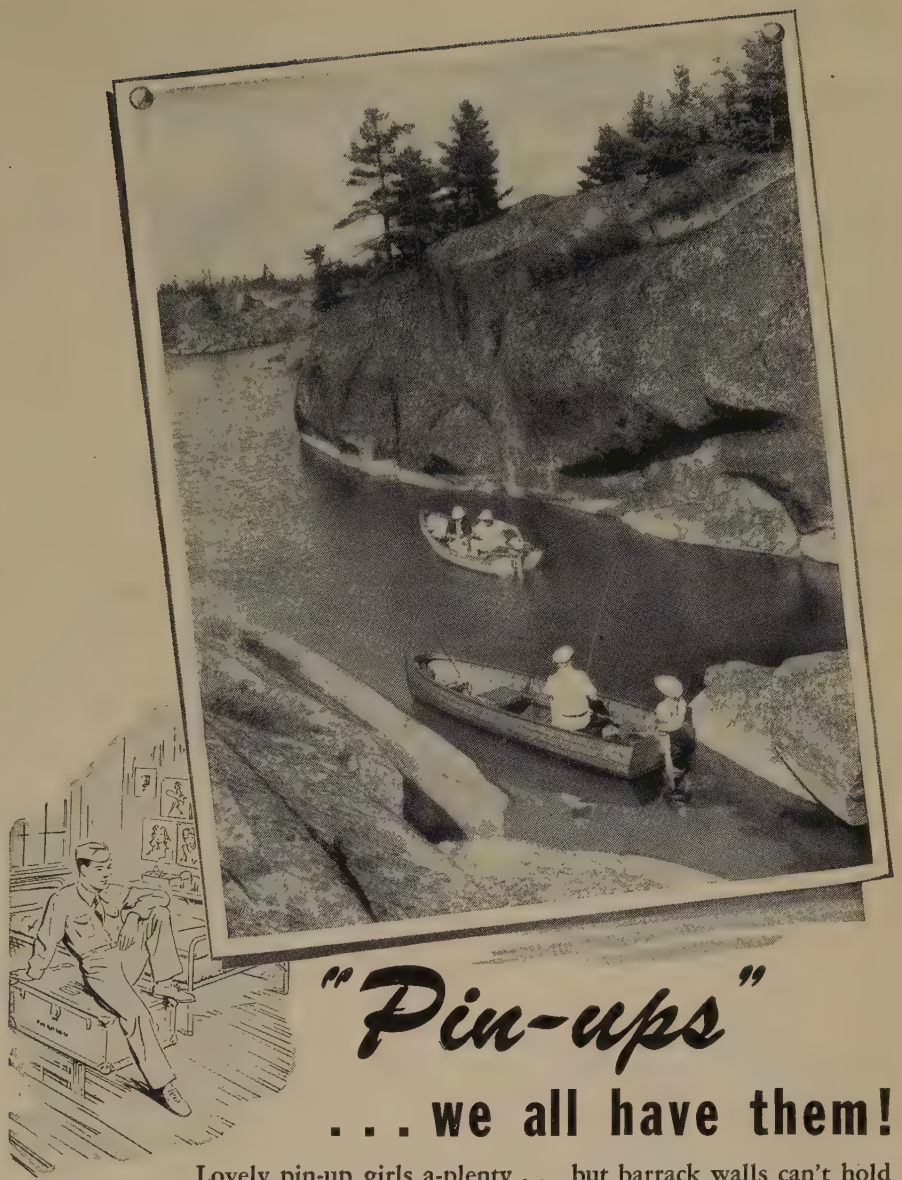
Wild Geese call
into the night
and wing northward
their Spring flight.

Who guides them
through the storms
and dark?
Who guides them homeward
in their flight?

Awaken sleepy student!
Can you tell me
from your books,
why do Geese fly northward?

Canadian Parks

Since the first national park area was set aside in Canada in 1885, the Dominion has spent \$42,000,000 on the development and maintenance of the national park system. This does not include the value of the land. The first reservation was a tract of ten square miles around the hot mineral springs at Banff, Alberta. From this beginning a system of twenty-six reservations embracing 29,000 square miles has been established. Although war conditions have affected travel to the parks, attendance has held up surprisingly well, between 25 and 30 percent of the visitors being men and women of the armed forces. The Dominion is maintaining the areas in anticipation of greatly increased travel after the war.



"Pin-ups"

... we all have them!

Lovely pin-up girls a-plenty . . . but barrack walls can't hold all the pictures a soldier sees. Beyond are other scenes . . . perhaps of that winding inlet, blue and silent . . . the big grey rocks topped with pines against the sky . . . the bass that smashed and fought like fury . . . "Man, oh man . . . when I get back!"

In fox-hole or gun turret . . . or at bench, machine or desk . . . we all have our "pin-ups". Things we've enjoyed before and that we're going to enjoy again. Mental pictures that to each of us satisfyingly symbolize the freedom that America is fighting and working for.

The fine motors that now go, and which for more than two years have been flowing from the Evinrude plant to all branches of our fighting forces, are designed to speed the day of Victory . . . when *pin-ups* can become *realities*.

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WILD FLOWERS IN THE DOLOMITES

(Continued from page 260)

nearby. Turning to the east we faced the Tre Cime as it gloriously reflected the light of the setting sun. In the near distance to the west, Mt. Tofana was plainly visible, while far beyond, the huge glaciers of the central Alps were discernible. For breath-taking beauty I had seen nothing in the Swiss Alps to excel this view from the battlefield of Mt. Piana.

As I stood there amid a varied profusion of blossoms, with my eyes on the snowy summits, I reflected on the bounty of God's gifts to man, and the eagerness with which the flowers and grasses, as if ashamed of our folly, attempt to erase the scars of war. When we at last thoughtfully wound our way down among the pine-scented shadows to the lake below and heard again the peaceful tinkling music of the bells, there came to my mind the lovely lines of Tennyson:

"I found Him in the shining of the stars,
"I mark'd Him in the flowering of His fields,

"But in His ways with men I find Him not."

THE WOOD THRUSH ARRIVES

(Continued from page 246)

been solidly built and snugly braced in a fork, this later one seemed carelessly built, and, as subsequently proved, was insecurely placed among the twigs in the top of the syringa. Three eggs were laid this time, and incubation was soon begun. I kept watch on this nest, too, as much as possible, stopping to pass the time of day with Mrs. Thrush. She would silently look at me in gentle tolerance. Then one afternoon came a thunder shower, one of those mad, intemperate summer storms with driving rain accompanied by lashing wind. As soon as the shower subsided I hurried to the nest only to find it upside down on the ground under the bushes, one egg gone, a second broken and a naked young just hatched. Sorrowfully I replaced the nest as best I could, being careful to put it back in exactly its first location. Shortly, to my relief, I found the mother thrush back on the nest, brooding the young that apparently was unhurt by the fall.

Although it is always risky and sometimes unwise to take even a helping hand or interfere in any way with nesting birds, I shall always be sorry I did not tie this nest securely to the syringa twigs. With care I feel that I could have done so, thereby saving the young thrush and perhaps the egg that was cracked. It could have been done by using green, brown or gray string; then watching

when the thrush was away from the nest to begin securing it. In this way I feel I could not only have made the nest fast, but by running anchor strings down to the ground on three sides I could have prevented the bush being tossed by the wind.

Many nests are upset and wrecked by wind storms. Later, during my absence, this nest was again thrown down and the young perished, and the birds did not try to nest a third time. So this coming summer, in case the thrush should build a flimsy, insecure nest, I shall feel justified in attempting to secure it.

DESERT CINDER CONES

(Continued from page 244)

canism, yet the record of an event that has added immeasurably to the lure of the desert.

Occasionally, in this region, revival of the old lava flow from an expiring crater has breached the cindery walls of a completed cone, and lent to the unique landmark this new feature of interest. These and older "rivers of rock," emerging from crater bases, may be traced by their black, volcanic basalts outcropping jaggedly across the fierce cholla flats, or lying as extensive sheet-flows of blistered and barren rock about them.

Ubehebe Crater, a colorful bowl, rises from the sun-baked, pastel-shaded trough of Death Valley. Amboy on the Mojave is a well-defined cone of dark cinders, scoria, and pumice, mounted on two tabular flows of black, vesicular basalt. Pisgah, also south of Highway 66 traversing the Mojave, and many other cones at Mono, near Baker and Kelso, and in Owens Valley, highlight the California deserts with points of interest. North of mysterious, symmetrical Black Rock Volcano other cones and craters dot and pock the desert, and extinct volcanos may be viewed east of Glendale in southern Utah. Sunset Crater flames brightly red-orange at its 1000 foot summit east of Arizona's San Francisco Peaks. Nearly 400 cinder cones, spatter cones, craters and vents occur in this area, together with such other phenomena as lava flows and tubes, ice caves, "squeeze-ups" and extinct fumaroles, all of them notable contributions of Vulcan to our mystic wastelands.

YOURS FOR THE LISTENING

(Continued from page 248)

purring note. It sounded like kittens, purring several octaves above middle C. Then there was a rush of wings, and three little flashes of white flew past me and landed in the weed-patch. Gingerly I walked to where they had landed, but the tinkling and crackling ice seemed to become louder and louder as I ap-

proached them. The snow buntings made no attempt to fly, however, and when I reached the oasis of brown weeds I found them running about on the ground. First one would run, then another; when the first bunting reached the end of the weed-patch, all three took off again in the direction from which they had come. They were joined in flight by more buntings, and the entire flock swirled over the fields, like an eddy of snowflakes.

In many parts of the country the buntings are known only by the name "snowflake." To see them whirling about in mass flight, their flashy white plumage gleaming in the winter sunshine, it is hard to think of them as anything else. For the snow buntings are of the essence of winter, yet they show none of winter's harshness. They are like gay children, yet they are part of the storm; their laughing voices, like the tinkling bells of the breaking ice, ripple across the bleak fields of winter to warm the hearts of those who would hear them.

The song of a bird or the rustle of wind through a tall tree in autumn may be joyous or peace-giving, but its message goes deeper. No matter where your favorite place may be, whether it is desert or forest glade, orchards or hillside, remember its voices. Some day a quiet vesper will come to you—from a meadow, or a whisper from the sea—and you will be home again, although the years and the miles may be many.

THE GROVES GO TO WAR

(Continued from page 236)

Black strap molasses is now being produced in Florida from this waste juice from the presses. The molasses is used in the cattle feed to increase carbohydrate content.

Other by-products from America's citrus groves, not so important at the present time, include vinegar, citric acid, glucosides, candies, candied peel, and even lactic acid, which is used in the manufacture of plastics.

Citrus juice and peel preparations have been found to greatly accelerate the growth of the mold *Penicillium notatum*, used for penicillin production. But the work is incomplete and it is too early, as yet, to know whether citrus can serve to enhance the penicillin supply.

Figures from the citrus industry are staggering. During the 1942-43 season, it has been estimated that groves in the United States produced 82,446,000 boxes of oranges, 46,899,000 boxes of grapefruit, 13,300,000 boxes of lemons and 175,000 boxes of limes.

Much of this crop was bought by the United States government for use by the armed forces or through lend-lease agencies. So, with this tremendous golden flood going to our own fighting men and to our allies, it is not difficult to see how our citrus groves are in the war.

ARLINGTON BIRDS

By PVT. JAMES EARL COMFORT

Contrary to the belief of many Nature-minded persons it is seldom necessary to travel far in order to indulge in one of the most pleasant hobbies—bird study.

Arlington National Cemetery is a good example of the readiness birds show in adopting a sanctuary even though the haven was not created for their benefit.

In the spring the wooded section is covered with many varieties of flowers, and bird songs in profusion greet the fortunate Nature lover. Here warblers, vireos and many other species of birds gather in the spring migration to transfer this spot into a fairyland. Many kinds will remain to rear families. The wooded hillside rings with the songs of nesting hooded and Kentucky warblers, wood thrushes, red-eyed vireos, towhees and many others. Ovenbirds teeter on the carpet of last years leaves, as they emphatically call their "teacher, teacher, teacher."

Phoebes, pewees and Acadian flycatchers, between snatches of song, snap insects from mid-air before returning to their favorite perches, and many other kinds of bird life entertain us in other sections of the cemetery.

Resident barred owls, and sparrow, red-shouldered and Cooper's hawks afford us a variety of studies of their interesting habits. Quite often I have seen the Cooper's species demonstrate its fierceness at the expense of song birds.

In April I was surprised to find a horned grebe had taken possession of the small cemetery pond. This bird refused to be hurried away by park policeman, although it was in no wise injured.

During 1943 I compiled a list of 137 species of birds at Arlington. Among the rather rare birds of the Washington area were warbling vireos, blue-winged warblers and white-crowned sparrows. Robins and bluebirds wintered in the more sheltered sections.

Nearly every large city has one or more Nature havens comparable to the National Capital's Arlington Cemetery. Opportunity for Nature study is where you find it, and it is usually far more easily found than we are prone to believe.

Moony

The Moon is Near. By Harry William Nelson, Groton, Conn., 1944. Published by the Author at Pleasant Valley Road. 24 pages. Illustrated. Fifty cents.

Written for Donna, Diane, Elaine, Elroy, Errol and Alma Pearl "and for all youngsters who want to be read to out of a book with pictures," this little booklet is a blank verse story of adventures with the little people of the moonlight. The author supplies both text and drawings.

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Under the Microscope

By JULIAN D. CORRINGTON

CHICK EMBRYOS

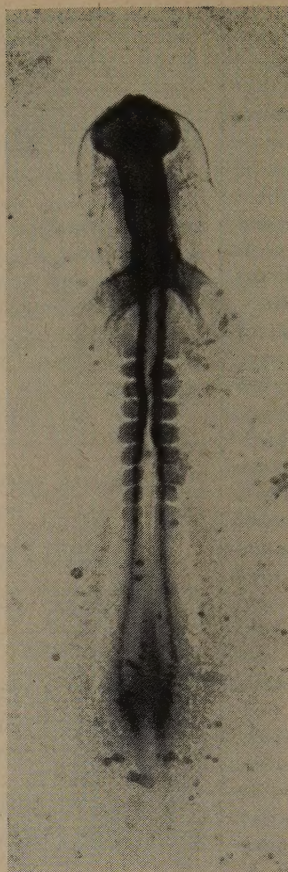
Each of the biological sciences has its favorite type forms, the laboratory study of which has become time-honored. The ideal attributes of such a type dictate that it must be representative of the material to be covered, and must be familiar, common, inexpensive, and of a size large enough to reveal the facts to beginners, yet not too large for convenience of storage. Thus the frog for introductory zoology, the cat for comparative anatomy. Embryology presents, however, the most classic of all types, the chick embryo.

From the dawn of written science, men have attempted to work out the sequence of stages through which the embryos of higher animals pass by viewing the chick during its twenty-one day voyage encased within a shell. Hippocrates and Aristotle, without benefit of lenses, described the steps of development beginning with the third day of incubation, when the heart becomes visible as a tiny pulsating speck. Aristotle, especially, performed a very fine piece of research for his time. Harvey with a hand lens and Malpighi with a compound microscope, made the chick the subject of famous special studies. Wolff used the chick in his thesis for the doctorate, *Theoria generationis*, 1759, unquestionably the most celebrated dissertation ever written. Von Baer, father of modern embryology, and countless others since, have investigated this animal.

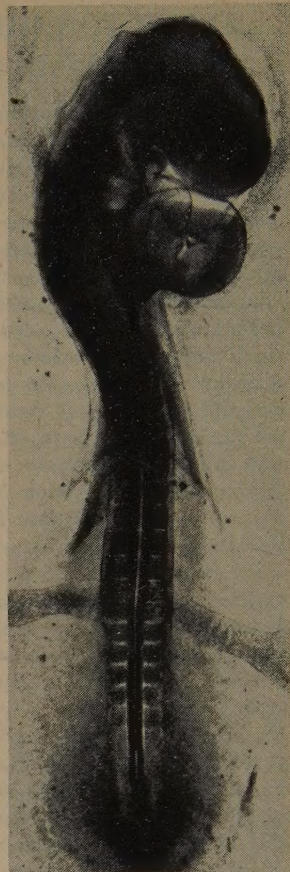
The frog is a very good embryological type, but presents certain disadvantages in comparison with the chick: the yolk is difficult to section, amphibia pass through a larval stage, and the fetal membranes of higher vertebrates are not present. Mammals would be best from the standpoint of human interest, but early stages are rare and expensive, as well as highly modified. The youngest pig embryo commonly studied (6 mm.) is as far advanced as the oldest chick (96 hr.). Consequently the pig is used to take up where the chick leaves off, and the sequence in standard courses of embryology is frog, chick, pig, with much the greatest emphasis on the chick. In our March, 1943, installment, certain aspects and methods of frog embryology were discussed, and in a later issue we shall take up pig embryos: now for the chick.

There are but two requirements for this work beyond the usual equipment; a source for fertile eggs, and an incubator. A poultry farmer or hatchery, if none are known to the beginner in this work, can usually be located through a grocer, and it is neither difficult nor expensive to arrange for the delivery of a small number of fertile eggs of a known date of laying. These are then marked as to date and placed under a setting hen or in a commercial incubator or in the laboratory type of incubator or oven, as used in bacteriological work or paraffin imbedding. Any device will serve that can deliver a constant temperature of 37° C. (99° F.), the most favorable for development. If the heat falls below 25° C. (77° F.), development ceases; if it goes much above 40° C. (104° F.), the embryo will die. The air in the incubator must be kept moist, and the eggs rotated once each day. Eggs are removed for processing whenever one or more have reached the desired stage of incubation.

Development is a perfectly continuous process, with no halts at stations along the way. In order for one person to describe anatomical features to another, however, the condition of the body and its various organs must be depicted as of some definite age, just as a still picture is taken from a continuous



Twenty-four hour chick embryo, whole mount.

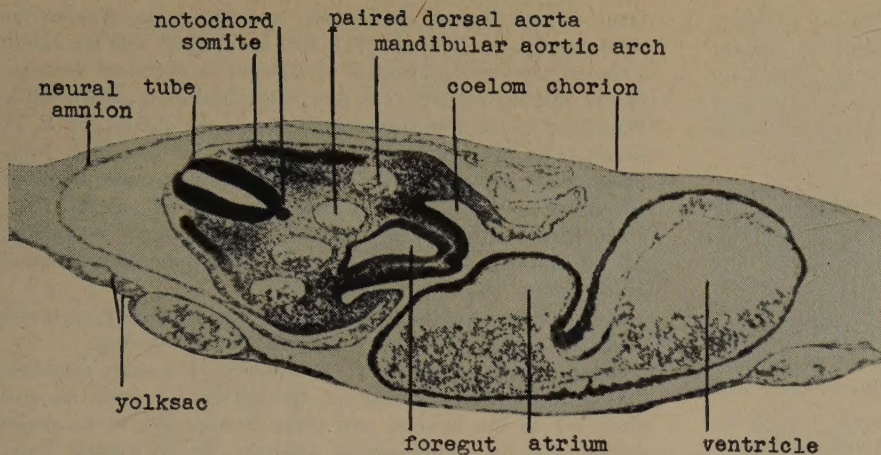


Forty-eight hour chick embryo, whole mount.

movie film for advertising purposes. Choice of stages for this purpose is made at times when important new developments occur, or according to days of incubation, and permits textbook discussion and picturization of snapshots, as it were, from the unfolding life cycle. Incidentally, such choice also makes it possible for supply houses to offer a limited series of slide preparations; it would not be practical commercially to stock an endless array of whole mounts and serial sections. The stages agreed upon as most useful in teaching are those of 18, 24, 33, 48, and 72 hours of incubation. Some leeway on either side of the standard hour is permissible; a 46 or 50-hour chick would be classed as a 48.

Another way of indicating age is by counting the number of pairs of somites, those blocks of mesoderm that appear on each side of the nerve cord and notochord, and from which the future vertebrae, most skeletal muscles, and the deep layer of the skin develop.

The unfertilized hen's egg consists of the egg cell proper—the huge ball of yolk, plus numerous accessory structures, including albumen, membranes, and shell. On the surface of the yolk is a small circular whitish spot, the blastodisc or germinal disc, which contains all of the living protoplasm. After fertilization, cleavage affects the blastodisc only, the inert and non-living mass of yolk taking no part in earlier processes. Cleavage occurs before the egg is laid, and gastrulation at laying or shortly thereafter. By sixteen hours of incubation, a slit-like furrow appears in the center of the blastodisc (or blastoderm, as it may now be termed). This is the primitive streak, and from its anterior end will grow the body of the chick. The 18-hour chick shows a head fold or process, with neural folds indicating the future brain. At 21 hours the first furrow appears in the mesoderm, followed by others at roughly one-hour intervals as far as the 48-hour stage, then less rapidly. These mark out the somites, the 24-hour chick having four to six pairs, the 33-hour chick thirteen; at 48 hours there are



Forty-eight hour chick embryo, cross section through the heart. Photomicrographs from slides loaned by Ward's Natural Science Establishment.

twenty-four, while at 72 hours there are thirty-six.

Differentiation of tissues and organs from the undifferentiated germ layers of the primitive streak proceeds from the head end in a tailward direction, a performance known as cephalo-caudal progression. In relative terms, only the head end of a 48-hour chick is "48 hours old," i.e., shows that amount of differentiation. The mid-portion of the body has reached the 33-hour stage, the hind end the 24-hour stage, while in rear of the formed chick there is still a primitive streak, a 16-hour feature.

First-formed and largest organs are the brain and heart; in fact, the chick seems almost wholly brain and heart for a long time. The eye begins early and is well along by the end of this series, while a host of other organs may be seen on examining cross or sagittal sections.

One of the most widely useful and ingenious inventions of the biologist is the serial cross section, whereby an entire organism, as a 48-hour chick embryo, is sliced on a microtome into sections of uniform thickness, then all of the sections mounted in continuous rows on one or more slides, beginning at the head end of the animal and proceeding through to the tail, all sections oriented alike. Paraffin ribbons containing the sections are affixed to slides, all sections being stained and processed simultaneously. A large rectangular cover glass is used. Experts can get an entire chick of 33 hours on a single slide, sometimes even a 48-hour chick, though with some crowding; 48 and 72-hour stages are usually spread over two or more slides.

In working with such preparations the student may, for example, be interested at the moment in the structure of the heart. First observing the appearance of this organ in some section through a point near its middle, he then moves the slide slowly from section to section, passing anteriorly, noting what happens to each chamber and vessel. Returning to his starting point, he next does the same in a posterior direction. This procedure

readily permits building up a picture in the mind of the three-dimensional nature of the heart, with the aortic arches and other vessels. A given structure is seen to get smaller and smaller and finally peter out in passing tailward; another becomes larger and finally meets and fuses with something else; another shifts its position with reference to other landmarks and the operator follows it from section to section to find out where it will finally end. When studies of this sort are made of the same organ in chicks of progressive ages, a very clear picture is obtained of the development of each organ and system in turn.

By projecting tracings of each such section on wax plates of uniform thickness, then piling these plates one upon another in proper sequence, cutting out cavities and smoothing over inequalities, enlarged models are made of entire embryos or any of their organs. The subject is a very comprehensive one and we shall have occasion in subsequent issues to go further into the use of chick embryos in studying embryology.

TRADE NOTES

The best survey text in biology yet to appear is, in our opinion, *Man and the Living World* by E. E. Stanford. The author teaches at the Stockton (Calif.) Junior College, which took over the first two years of work at the College of the Pacific, and he thus brings both Junior and Senior College viewpoints to bear on organizing his subject matter. He had done a superlative job, with brief but sufficient treatment of very wide scope, possesses decided skill and charm as a writer, and has chosen a large number of fine illustrations from many sources, original and borrowed. At a rule, material is kept at a level suited to the college underclassman. Man as an individual and as a social animal is kept before the reader, but not to the exclusion of other important concepts. We especially liked the treatment accorded the history of domestic breeds of both plants and animals,

Background for the Microscope

Equipment for the pursuit of microscopy may be as simple or as elaborate as individual inclinations dictate; but there is one item wholly indispensable—books! The microscope is handmaiden to all the sciences, and those who follow its adventuresome trail must have many a guide to direct along the right path.

Here is NATURE MAGAZINE'S selection of best bets. Check your library and add those that fail to answer the roll call. Buy one each month, or as often as you can. Suggest them as gifts. Buy them for the relative or friend whose chief joy is working with his microscope. Entries will be changed periodically; here is a basic list for a starter:—

MICROSCOPE

- The Microscope**, by S. H. Gage; 17th ed., most celebrated American work; very thorough.....\$4.00
The Microscope, by R. M. Allen; Excellent new manual.....\$3.00

MICROTECHNIQUE

- Working with the Microscope**, by J. D. Corrington; New guide for self help or classroom with graded series of lessons, from single to advanced.....\$3.50
Adventures with the Microscope, by J. D. Corrington; An informative and interesting text for the younger hobbyist or biological student.....\$5.00
Animal Micrology, by M. F. Guyer; Best general guide for histology and zoology at the college level.....\$2.50
The Microtome's Vade-Mecum, by A. B. Lee; Encyclopaedic reference, standard, advanced; botany and zoology.....\$9.00

PHOTOMICROGRAPHY

- Photomicrography**, by R. M. Allen; Splendid new work by recognized authority; complete; fully illustrated.....\$5.50

BOTANY

- Textbook of Botany**, by Transeau-Sampson-Tiffany. Beautifully designed, readable, recent.....\$4.00

ZOOLOGY

- College Zoology**, by R. W. Hegner, Fifth Edition; most successful work of its kind; gives all main animal types and their structure.....\$3.75
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Man and the Vertebrates, by A. S. Romer. Companion volume to preceding; excellent general survey.....\$4.75

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national forests and parks, conservation, poisons and drugs, eugenics, and other topics commonly neglected in similar works. A fine college text, high school reference, and especially suitable for the private reader who wishes a survey of modern biology. Pp. xxviii, 916; figs. 451. The Macmillan Co., 60 Fifth Ave., New York, 1940. \$3.50.

A distinctive and unique contribution to knowledge of human heredity is presented by Dr. David D. Whitney (University of Nebraska) in *Family Treasures*. Most texts of genetics and/or eugenics are necessarily concerned with a host of technicalities; cases of human inheritance used as examples deal mostly with abnormalities, as color blindness, short fingers, feeble-mindedness, and the like. In this new book, on the contrary, the known or probable methods of heredity of more than two hundred normal family traits are explained, mainly by means of photographs. By masking or blanking out all features save the one under consideration, these illustrations focus attention on the trait discussed in each case. A host of characteristics of the hair, nose, eyes, mouth, ears, chin, hands, feet, and other structures are considered in turn.

The author states the purpose of his volume in the preface: "This book is written for amateurs in the study of human heredity and for those who are interested in personal inheritance of family traits. It is a simple presentation mainly by photographs of many of the normal traits appearing in families of two or more successive generations." He is further concerned with the substitution of sound scientific fact for reliance on astrology, good or evil spirits, mother's marks, wishful thinking, and other holdovers from ancient and medieval times. Pp. 299; figs. 234; glossary. The Jacques Cattell Press, Lancaster, Pa., 1942. \$3.50.

TRASH

(To a young biology laboratory assistant)

When the class is protozoing
And your untried culture's showing
Puzzling forms you'll not be knowing
As from 'scope to 'scope you dash,
When you're asked "What's that thing yonder?"
Do you vainly frown and ponder
While your neurons gaily wander,
Then declare, "Oh that's just trash?"
Or perhaps another section
Studies tissues, makes inspection,
And a lad reports detection
Of some cells resembling hash;
Their identity defies you,
Histologic knowledge flies you,
But you're there with the replies, you
Tell him that it's "merely trash."
Now if "trash" and "foreign matter"
Form the burden of your patter
As your pallium grows fatter,
You must not expect to crash
Those pearly gates supernal
Where old Peter reigns eternal,
For he'll turn you toward infernal
Regions, saying, "Beat it, Trash!"

BIOLOGICAL LABORATORY MANUALS

VI. Mammalian Anatomy

A large number of laboratory books are available in this field, based on the four most popular types—the cat, rabbit, rat, and fetal pig. Listed here first are certain standard and well-known texts and manuals widely used for many years.

The most complete reference on the cat, both a text and a manual, is Reighard, Jennings, and Elliott, *Anatomy of the Cat*, 3d ed., 486 pp. 1935, Holt, \$5.00. The same authors present a briefer laboratory guide to accompany the above, *Dissection of the Cat*, 2d ed., 106 pp., 1935, Holt, \$1.25. Equally in

favor for cat anatomy is Davison and Stromsten, *Mammalian Anatomy*, 6th ed., 328 pp., 1937, Blakiston, \$3.00. For the rabbit a similar service is performed by Bensley in *Practical Anatomy of the Rabbit*, 6th ed., 320 pp., 1938, Blakiston, \$3.00, while *Principles of the Functional Anatomy of the Rabbit*, by E. D. Crabb, is an elementary laboratory guide; 137 pp., 1931, Blakiston, \$1.50. Older Macmillan publications include Bigelow, *Directions for the Dissection of the Cat*, rev. ed., 65 pp., 1935, \$1.00; Hunt's *A Laboratory Manual of the Anatomy of the Rat*, 125 pp., 1924, \$1.40; and Baumgartner's *A Laboratory Manual of the Foetal Pig*, 57 pp., 1924, \$1.10.

Among newer publications or those not previously reviewed or discussed in these columns, are the four following:

Mammalian Structure, by C. J. Wideman, is a short combination manual and atlas on the cat. Instructions for dissection and study are of the briefest and identifications are to be made mainly from the accompanying drawings. Pp. 60, Loyola Univ. Press, Chicago, 1941, \$1.20.

The Dissection of the Rat, by Starks and Cutter, is a thorough-going piece of work for a one-semester course; compact, topographic, paper-bound. The directions are clear, complete, easily followed. Pp. 45, Stanford Univ. Press, Calif., 1931, \$0.75.

The Fetal Pig, by Hazel E. Field, another Stanford publication (paper, pp. ix, 53; figs. 16; 1939, \$0.75) is a carefully executed manual of selected topics, intended for use in the beginning course at the college level. The aim is to teach fundamentals of mammalian anatomy, with certain developmental features, to students who will not pursue the subject further. Stress is laid on systems that lend themselves well to elementary work with the pig and to those most apt to possess lasting interest for the general student. As a consequence the skeleton is merely outlined, the muscles omitted entirely, and finer ramifications of vessels and nerves are not followed. We believe the author has chosen wisely and produced a book that serves its purpose admirably.

Professor John G. Sinclair, in *Anatomy of the Fetal Pig*, aims at much fuller and more advanced treatment, the book being intended for an upperclass course, suitable for pre-medical students. The arrangement is systemic and, in each section, description and directions are followed by an "interpretation" (unfortunately in small type; a mistake, in our opinion) which discusses functional or developmental aspects in a highly interesting and informative fashion. Details are very well presented and the illustration are unusually numerous, thorough, and helpful. Pp. xiv, 81; figs. 51; spiral binding, flexible covers. Collegiate Press, Inc., Ames, Ia., 1937, \$1.00.

The second edition of King and Roser, *Anatomy and Physiology Laboratory Manual and Study Guide*, has been shortened by the elimination of construction details of laboratory apparatus and of certain exercises that experience had shown to be too time-consuming. New exercises have been added and the questions revised. To those unfamiliar with this unusual publication, we can best describe it as a large work-book on human anatomy and physiology, primarily intended for use in schools of nursing. The directions are brief and explicit; many questions are asked or topics discussed, with blank spaces for their answering or completion; a large number of excellent drawings are provided as supplementary to explanations, but more often for completion; all of the standard physiological experiments are included; and there are charts to fill in, histological slides and gross sections and dissections to draw and master. Since most of the work is done on small mammals, with applications to man, departments of biology or zoology in liberal arts colleges and universities will find this manual highly suggestive and helpful, and the individual working alone can derive a deal of benefit from it, even though unable to perform all of the specified exercises. It is very well planned, written, illustrated, and published, with the following units: the body as an integrated whole, the erect and moving body, metabolism of the body, reproductive system, the nervous system, appendix on methods and preparations, and index. Pp. xi, 253; figs. 61. W. B. Saunders Co., Philadelphia, 1943, \$2.75.